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ELECTRICAL WORLD

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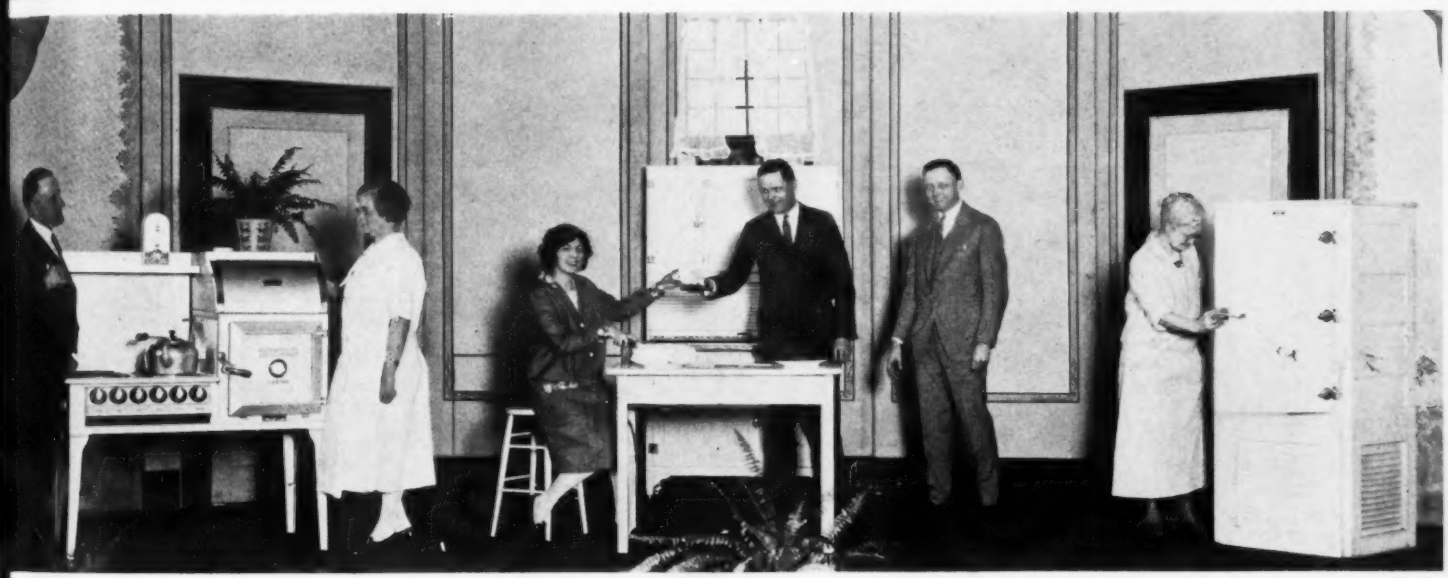

USE THE SALES PLANS

● The electrical industry should give wholehearted and enthusiastic support to the sales programs that have been developed. They are splendid, practical plans that will bring results if the industry will use them. Utilities, manufacturers, jobbers and retail outlets have one goal — to get more people to use more electricity.

● Prepared sales programs are available to sell refrigerators, ranges, water heaters, lighting and small appliances. Extension wiring for more outlets, adequate wiring for old houses, complete electrification for new homes are completed projects to bring business. Small industrial heating device sales, rehabilitation plans for factories, power sales and industrial lighting applications afford opportunities for more industrial business. In addition there is the rural market, street lighting and main street decorative and utilitarian lighting to stimulate specialized selling. Air conditioning also promises to be an enormous business.

● No Moses from outside the electrical industry will lead it to prosperity. It must sell its way out of the depression and each individual and each group must build its own prosperity. Much can be done by using the well-prepared sales plans that are now ready. Sane optimism, sales enthusiasm, wholehearted and co-operative action in the markets — these point the way to better business.

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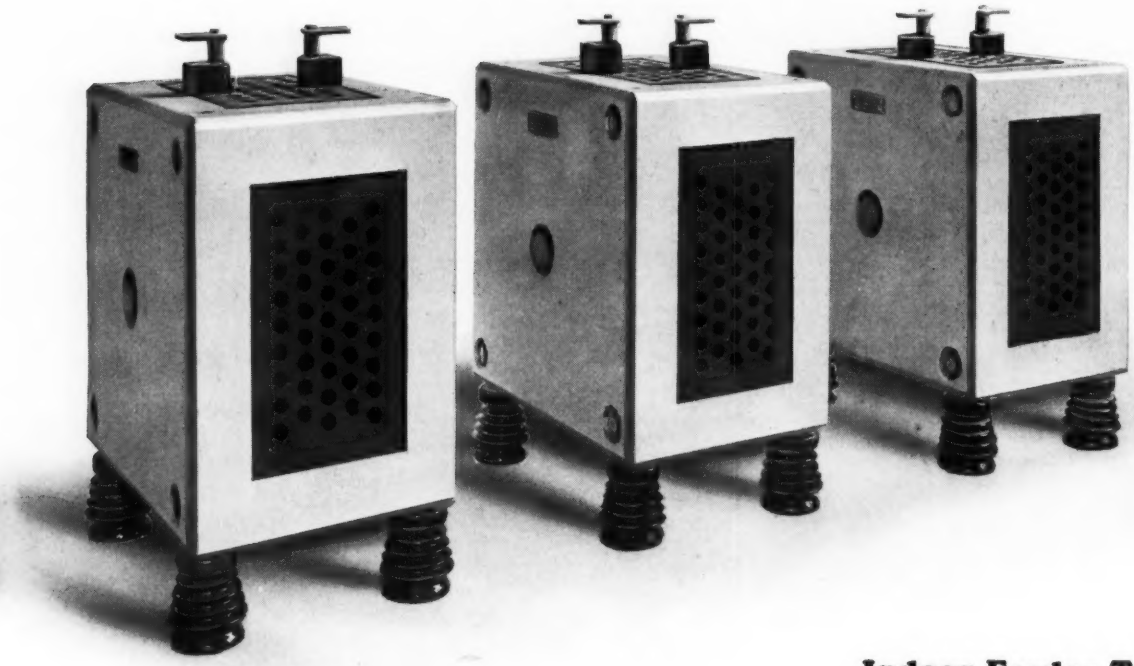

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Large Copper Areas, Enameled and Insulated Conductors, Ruggedness, Small Space Requirements, Highest Efficiencies, Highest Short Circuit Protection, Lowest Temperatures

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Potomac Electric Co.
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Union Gas & Electric Co., Cincinnati
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Havana Electric Light & Power Co.
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Edison Electric Illuminating Co., Boston
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Department Store Sales Shown in Committee Report

Electrical appliance sales are becoming of greatly increased importance in department store business, if the survey results just reported by the Electrical Merchandising Joint Committee covering forty leading stores, most of which had total annual store sales of $10,000,000 or over, can be considered representative.

Kenneth Dameron, executive secretary of the joint industry committee, has estimated the potential electrical market of the department stores to be about $5,000,000,000 and the results of the survey indicate that both a scientific appraisal and development of the potentialities of this market are likely. Mr. Dameron previously reported (ELECTRICAL WORLD, May 7, page 794) upon the distribution of electrical merchandise to the consumer by the various types of outlets. Department stores were then credited with 24 to 30 per cent of such sales.

The stores reporting in the recent survey indicated that 19.9 per cent of their home-furnishings sales were in electrical appliances. Six stores reported that their appliance sales accounted for more than 20 per cent of their home-furnishings volume, while two noted that electrical appliances represented nearly 50 per cent of their home-furnishings sales total.

"The mark-up and turnover figures given by these stores," points out Mr. Dameron, "show that the department store methods of merchandising appliances are highly efficient. The following table gives the mark-up, markdown and turnover figures, with an average based on only the number of stores reporting significant figures for each factor. The high rate of turnover may reflect the tendency of many department stores to sell major appliances on a sample basis."

The figures follow:

Items	Mark-up	Mark-down	Turnover
Washing machines	38.5	6.2	6.1
Dish washers	40	3	1
Floor polishers	31.3	..	1
Ironers	36.4	2	5.9
Refrigerators	31	2	9.4
Sewing machines	32.5	5	4.8
Vacuum sweepers	25.2	1	5.5
Clocks	39.8	3.1	4.8
Curling irons	39.7	2.8	8
Food mixers	39.2	2	..
Hot plates	40.5	3.5	3
Irons	40	3.8	5.3
Percolators	38.7	3.3	4.3
Toasters	38.7	3	5
Waffle irons	39.1	3.3	5.2

"All of the stores reporting used store facilities for financing consumer purchases of major appliances. All except two of the stores reporting stated that store facilities for financing consumers were satisfactory."

The committee believes that without doubt methods of financing consumers will assume increasing importance. One sales analysis indicated that 49 per cent of open-account sales of electrical appliances were of products selling at $10 and under. The question was raised as to whether some plan of financing should be developed for products of this value. As a rule, finance companies will not go below $50, although one exception has been reported.

In estimating the potential market for electrical devices the committee stated that the annual consumption of electricity in the average home is only 8 per cent of the consumption of a completely electrified home of average size. It held that a tripling of this consumption figure may conservatively be expected, and to attain this figure the committee estimated that consumers will need to purchase $5,000,000,000 worth of appliances. Viewed from this standpoint, the appliance field was seen a major source of added sales volume for the department store.

Nogales, N. M., in Darkness Because of Tax Dispute

Defying the city government's attempt to collect arbitrarily certain taxes, the Public Utilities Consolidated Corporation, serving Nogales, Ariz., cut off the electric current November 22, throwing the town into darkness. The city had paid its October electric bill, but had deducted gas main taxes which the company had refused to pay.

Trouble between the city and the corporation is said to have been brewing for two years. At the present time the city has a petition before the State Corporation Commission requesting a reduction in rates. There also is a court action pending. The city's efforts to tax the gas mains are said to be a retaliatory measure for the company's efforts to prevent rate revisions.

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Hartford Credit Plan Proves Popular Move

Responding to the offer of the Hartford Electric Light Company to supply service on a credit certificate basis for three months in cases where the need for such accommodation has been set forth by written application (ELECTRICAL WORLD, May 21, 1932, page 877), 3,917 customers made application up to October 25, of which 2,120 carried old balances prior to June to the amount of $11,880. This amount has been reduced to about $3,722. Certificates presented in payment of bills amounted to $20,770, and of this amount 162 persons have taken care of their obligations to the total of $364. The number asking for certificates runs from 1 per cent of the domestic customers in rural territory to 5 per cent in factory towns. The plan is being continued.

Federal Power Board Seeks Holding Company Jurisdiction

Control of holding companies having relations with licensees of the Federal Power Commission and a more precise definition of the commission's powers over rates, services and securities of licensees, in addition to extension of authority for co-operation with the states in regulating the interstate transmission of power, are among the recommendations made in the twelfth annual report of the commission to Congress.

The feature of this year's report is the recommendation for amendment of the federal water power act. In discussing this act the report says: "In suggesting these amendments to the act the intent is not only to clear up ambiguities in the present wording and to remedy certain defects and weaknesses that have developed in the course of administration, but also within the scope of the purpose of the original act to enlarge and make more effective the authority of the commission.

"While the commission has given considerable thought to the questions of the regulation of electricity going into interstate commerce and of the holding company, so far as it affects the electric utility industry, the recommendations herein made in each of these fields are confined to the vesting of authority in this commission as to the holding company and the making more specific its authority as to interstate transmission, but in both only in so far as they involve the licensees of the commission. . . . It is convinced that the public interest requires the early vesting of authority in the federal government to control, so far as it may be determined to be within its jurisdiction, the regulation both of electricity in interstate commerce and of the holding company in the power industry."

The first proposed change in the act relates to Section 3 and involves the addition of the words "and prudent" in the definition of "net investment" so as to read: "Net investment in a project means the actual legitimate and prudent original cost thereof." It is believed that the addition of the test of prudence would plainly place a needed limitation on cost expenditures and this would strengthen the commission's authority in fixing the proper base for the ultimate determination of net investment.

The proposed amendment under Section 4 (a) is to add two new paragraphs. This would give the commission power to exert fuller jurisdiction over all companies and to require voluntary submission of certain records and reports.

In connection with the suggested amendment to Section 19 dealing with intrastate regulation and Section 20 with interstate regulation, the report states as follows:

The language of these sections, as it appears in the present act, should be changed for the purpose of clarifying the act in respect not only to the specific authority of the commission in the regulatory field, but also to the clarification of the very troublesome question of establishing a borderline between state and federal jurisdiction as to the regulation of electricity in interstate commerce. . . . The commission recommends an amendment of Section 20 looking toward a more precise definition of its powers of regulation of rates, services and securities of parties coming under the jurisdiction of this section, as well as of its relation with the state commissions in this field, and suggests particularly an extension of authority for co-operation between state and federal commissions in the exercise of its powers upon regulation of electricity in interstate and foreign commerce.

Discussing the proposed legislation to control holding companies, the commission says:

Any theory of federal regulation of the holding company should be considered with two fundamental purposes in view: (1) Regulation of the holding company in relation to the operating company and through the operating company to the consumer of electrical energy; and (2) regulation of the holding company in relation to the investing public, which is principally interested in the securities of such holding company. . . . The vital and essential prerequisite to any exercise of authority over either holding companies or utilities engaged in interstate commerce is the acquisition of the knowledge of company affairs upon which intelligent action toward regulation may be had. This information once available, the regulatory body, whether federal or state, is equipped to act. It is in this field that the federal commission in better position to act for both legal and practical reasons. In the practical operation of the amendment the federal activity would supplement the states in those cases in which the states are actually operating. . . .

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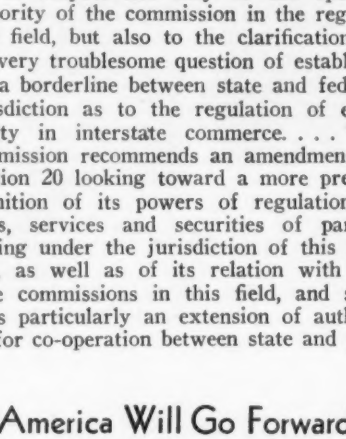
America Will Go Forward, Says George B. Cortelyou



Contending that if man cannot avoid becoming the victim of his own creation, cannot solve the economic and social problems which the age of machinery has brought and cannot emerge from the depression in which the world now wallows, that he deserves no better fate, George B. Cortelyou, president National Electric Light Association and Consolidated Gas Company, told those attending the Thanksgiving luncheon of the Electrical Association of New York that "the historic aspirations of America . . . for a better, freer and an ampler life are not doomed to frustration; they are destined to fulfillment."

Confident of the place and influence of the electrical industry in the new scheme of things, Mr. Cortelyou said: "Nothing on the horizon indicates any limitations upon the continued growth and use of electricity; on the contrary, the whole trend of technical development seems to confirm the general impression that electricity is only on the threshold of its real growth and service to man. We have heard of industries that have been wiped out over night by a sudden shift in popular taste or fashion, or by some new product displacing the old. But if electricity is to be displaced in this manner, it will be by something whose very nature is as yet unknown and unsuspected and indeed unimaginable in the light of our present knowledge. So, so far as anything can be certain in an uncertain world, it is that the electrical industry will be a cornerstone of the country's future economic progress, and that what it has been is but a foretaste of what it is to be.

"The successful business organization of the future will be the one that concentrates upon essentials, studies its markets, refuses to sacrifice quality to price, strengthens its research activities, cultivates employee morale, co-operates with other units of the industry, and if into the whole it is able to infuse an uplifting imagination, so much the better. Imagination may not rule the world, as Napoleon declared, but it certainly has a vast influence upon human affairs, including business.

"The electrical industry has a greater future than its great past, if it will profit by its mistakes—and all human enterprises register mistakes—if those who shape its policies are shaping them to an ever-increasing service to its customers, characterized by frankness, fair dealing, adequate publicity of its transactions; if it shall be honest with itself and with all those whose fortunes are linked with it in any capacity."

New Types of Rectifiers Serve Industrial Loads

Development of the mercury-arc rectifier and of the phanotron (gas-filled, low-voltage electronic tube) has taken place so rapidly that both are now economically and reliably adapted to industrial loading. Sectionalization is a characteristic of both, which makes investment in spare capacity inherently less in proportion than for rotating machinery of the synchronous converter or motor-generator type. That was the story told the power group of the New York Section of the American Institute of Electrical Engineers this week by C. A. Butcher of Westinghouse, who sponsored the rectifier, and W. S. Hill of General Electric, who told of the applicability of electron tubes to power and control tasks.

Both speakers were chided by William Arthur of Allis-Chalmers for leaving the impression that all the development had occurred in this country and in the last few years. He cited the more than 350,000 kw. of Brown-Boveri rectifiers, many sectionalized, in industrial service in Europe, exclusive of twice as many more in railway service. He did not, however, refute the assertion that the impetus given to European development of rectifiers was attributable to the prevalence of 440 volts for industrial power service, more favorable to rectifier performance and economics than the American 220 volts.

C. W. Stone, who did some of the pioneering on rectifiers with Steinmetz, could not agree with Mr. Hill's assignment of higher efficiencies to the synchronous converter at loads above 75 per cent than to the phanotron. Nor would he subscribe to the idea that sectionalization precluded the building of bigger and bigger units in either phanotron or mercury rectifier as the service might demand.

Approximate costs were cited by Mr. Hill as $43 per kilowatt on a 300-kw., 13-kv. supply installation of phanotrons, as against $32 for a converter set with transformers and $35 for a motor-generator set. Space saving, less valuable space demand, lighter foundations, lower maintenance costs tend to offset the disadvantage of the phanotron in first cost. The general claim was made by Messrs. Butcher and Hill that rectifier and phanotron are now available to give industrial loads the economic benefits of d.c. utilization on loads beginning at 150 or 300 kw.

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Modernization Committee

Further to aid in the work of the Committee on Industrial Rehabilitation, that body has issued a check sheet to stimulate manufacturers to make a thorough survey of possibilities for modernization in their plants. A booklet telling the story of modernization quickly and effectively has also been made available. Commitments for modernization costing about $1,000,000 are reported from New Hampshire.

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Portland Utility Issue Authorized by Commission

Authority to issue $7,500,000 general mortgage notes was granted by the Federal Power Commission November 26 to the Portland General Electric Company of Oregon, a licensee under the water-power act. This authorization follows the recent announcement by the commission of its intention to exercise the jurisdiction conferred by the federal water-power act to regulate and control the amount and character of security issues of the Portland utility (ELECTRICAL WORLD, November 5, 1932, page 614).

The commission prescribed that the interest is not to exceed 7 per cent. There is to be no discount or commission. The notes are to mature on or before August 1, 1935. This issue provides for the payment of an equal amount of unsecured 4 per cent notes maturing January 1, 1933, now in the hands of private investors and insurance companies.

Franklin T. Griffith, president of the company, furnished the commission with the necessary corporate records and financial statements essential to the study of the transaction.

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Associated Gas Decision Reserved by Court

Decision was reserved this week by Supreme Court Justice Wasservogel on an application by the Associated Gas & Electric Company to restrain Philip Newbold, a stockholder, from prosecuting an action for the appointment of a receiver for the company on his contention that its affairs had been mismanaged and its finances endangered (ELECTRICAL WORLD, November 26, page 709).

Arguing the case for the company, Joseph M. Proskauer, formerly judge of the Appellate Division, assured the court that the company had a bank account of $7,500,000 and in the last year had paid off $47,529,000 of current debts. He stated that Eugene S. Bibb, counsel for Mr. Newbold, had made an agreement with the petitioner and another stockholder that if they won their actions against the company he was to receive 35 per cent of all that they recovered. Mr. Proskauer pointed out that the receivership application was based only on a complaint and was not accompanied by affidavits supporting the charges.

World Trade Slows as Pound Drops

Sterling has touched a new record low. Doubt and uncertainty have brought the British pound to a point clearly reflective of the paralysis of world trade and of the hopelessness of creditor pressure to do more than produce further stagnation. Call it a bogeyman, if one will, designed to stir us to action, this relaxing of tension which enables Britain's monetary standard to sink lower and lower, yet the fundamental problem remains. Is it better to collect now what is due us and produce further trade depression or postpone the reckoning until our debtors can catch up?

At home things are somewhat brighter. Car loadings swept upward 38,758 cars, after four weeks of declines, and recovered in every class of business. Coal production increased appreciably, reversing its trend, and energy use shows renewed strength. Volume of business improves.

Prices continue weak for virtually all commodities, partly due to the exchange and international trade situation. Security prices hold their own with encouraging consistency in the face of bad and badly mixed news.

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Middle West May Continue as an Operating Entity

In permitting authorized common-stock holders of Middle West Utilities Company to intervene in the receivership litigation from which they were previously excluded Judge Walter C. Lindley has acted upon the filing of additional information by a committee representing stockholders.

The intervening petition stated that an audit and inventory has been filed with the court showing that "the corporate integrity of the company can be preserved and its unity maintained through reorganization and refinancing." It also said that the common-stock holders should have the right to aid in shaping the policies of the company. Holders of preferred stock were given the right to intervene in a previous ruling.

Creditors and debenture holders of National Electric Power and National Public Service have been urged by Irwin Kurtz, referee in bankruptcy, to file proofs of debt before January 7, 1933, to avoid the loss of right to participate in any distribution of assets.

Halsey, Stuart & Company, barred by the Wisconsin Public Service Commission from participating in business in that state, have been cleared by Judge Hoppmen of the Dane County (Wisconsin) Circuit Court.

Coming Meetings

American Society of Mechanical Engineers—Annual meeting, New York, Dec. 5-9. C. W. Rice, 29 West 39th Street, New York.

American Association for the Advancement of Science—Annual convention, Atlantic City, N. J., Dec. 27-31. C. F. Roos, Smithsonian Institute, Washington, D. C.

American Physical Society — Annual meeting, Atlantic City, Dec. 28-30. W. L. Severinghaus, Columbia University, New York.

American Institute of Electrical Engineers—Winter convention, New York, Jan. 23-27. H. H. Henline, 33 West 39th Street, New York.

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Georgia Power Backs Service Charge Principle

Elimination of the service and demand charges on energy rates would mean a loss of nearly $5,000,000 in revenue yearly to the Georgia Power Company and necessitate an increase of 39 per cent in the kilowatt-hour charge to offset this reduced income, Preston S. Arkwright, president of the company, told the Public Service Commission at the opening hearing last week in the case calling upon Georgia utilities to show cause why service charges should not be eliminated and a downward revision of rates put in effect.

It was Mr. Arkwright's contention that Georgia Power did not and had never earned "what is considered a fair return on the investment of its stockholders." Mr. Arkwright referred to testimony by Federal Trade Commission examiners in substantiation of this claim. Returns of 4.2 per cent in 1927, 5.2 in 1928 and 5.2 in 1929 were mentioned on the valuation set by the commission, which is $50,000,000 less than the valuation fixed by the company.

Denial that large consumers were served at less than cost was one of Mr. Arkwright's firm stands under cross-examination.

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California Commission Refuses to Order Rate Cuts

Petitions for a reduction in electric rates of Pacific Gas & Electric Company have been denied by California's State Railroad Commission in a sweeping decision disposing of a case dating back to 1925. In this decision the commission reviewed the case from its inception, pointing out the series of reductions ordered in rates of Pacific Gas and Great Western Power Company, now a Pacific Gas unit. These have aggregated some $6,000,000 since 1925.

Explaining the denial of further reductions, the order read:

"Using the lowest rate base suggested and the highest estimate of the amount available for return, it appears that for the year 1932 the consolidated companies will earn a return of less than 6.9 per cent on their electric operations, while if the net estimated by the company is used the return on the same rate base is approximately 6.75 per cent. Such an earning, in view of the downward trend of company revenue and other conditions, cannot be held to be such an earning as will justify this commission in issuing its order reducing any of the electric rates of these companies."

At the same time the commission denied the appeal of Coast Counties Gas & Electric Company from its order reducing rates by $40,000 yearly and cutting in half the management fees heretofore paid (ELECTRICAL WORLD, November 19, page 680).

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Oklahoma Utilities Obtain Rate Cut Injunction

Electric public utilities serving both domestic and industrial consumers are entitled to have their industrial rate fixed on the valuation of that part of their property allocable to the service of the industrial consumers, according to a decision handed down by three federal judges sitting *en banc* in the district court in Oklahoma City. The court granted an injunction to the Oklahoma Gas & Electric Company and the Southwestern Light & Power Company to prevent enforcement by the State Corporation Commission of an order issued several months ago lowering electric power rates for service to more than 50 cotton gins in southwestern and western Oklahoma.

The case was taken to the federal court after the two electric companies had been refused permission by both the Oklahoma Corporation Commission and the State Supreme Court to make a supersedeas bond to stay execution of the commission's rate reduction order until such time as the companies could file their appeal with the State Supreme Court and receive a decision from that court.

Involved in the federal court case was the question of whether industrial rates charged by an electric utility should be governed by competition or by the valuation of that portion of the utility plant needed to serve the industrial users. The Corporation Commission, through its attorneys, maintained the industrial rate should be governed by competition. The companies contended that the rate for industrial service must be based upon a proper return on that part of the company's plant allocable to the serving of the industrial consumer. In this stand they were sustained by the federal court.

The first hearing in the general investigation of rates for electric light and power recently ordered by the State Corporation Commission (ELECTRICAL WORLD, October 29, 1932, page 585) has been tentatively set for December 21.

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Utility Service Intangible Under Pennsylvania Ruling

Question having arisen as to whether the servicing of water, gas or electricity to a consumer through pipes, mains or wires is a sale of tangible personal property and subject to a state tax of 1 per cent of the gross income derived from such sale, the Attorney-General of Pennsylvania, William A. Schnader, has ruled that such water, gas or electricity is not "tangible" and therefore is not taxable.

Mr. Schnader declares that in construing the expression "sales of tangible personal property" he is "bound to regard the popular conception of its meaning rather than any technical construction." He concludes that in following the "natural reaction of the mind" he is unable to infer that the average person, in reading the act, would believe that the distribution of these products constitutes a sale of tangible personal property.

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New England Group Examined By Federal Trade Board

Expansion of fixed capital of various New England subsidiaries of the Associated Gas & Electric Company prior to their acquisition by the Associated system and accounting methods employed by the system in connection with the management of these subsidiaries were described last week in testimony before the Federal Trade Commission, which is examining various companies comprising the New England Gas & Electric Association.

In connection with testimony concerning the New Hampshire Gas & Electric Company, which was acquired by the system in 1927, the examiner testified that a "write-up" of fixed capital to appraisal values in the amount of $1,682,524 was recorded in "side records" of the New England Gas & Electric Association. He explained that the records of the New Hampshire company did not reflect this "write-up" as such amounts were carried in the association's consolidated balance sheet. An adjustment made in the retirement reserve in the amount of $737,449 brought the net "write-up" to $957,753, which was carried to capital surplus.

At the concluding hearing in the examination of the New England properties, the commission heard testimony rel-

ative to the Derry Electric Company, acquired by the Associated system in 1928. Examiner Van Zandt stated that from 1915 throughout 1929 there was a steady growth in fixed capital, resulting from current additions and betterments, and the balance in this account at the close of 1929 was $582,845. The amount, however, carried in the consolidated balance sheet of the New England Gas & Electric Association, Associated subholding company for New England subsidiaries, in "side records" was $788,771, or a "write-up," after certain adjustments, of $191,909 which was carried to capital surplus. The company did not pay interest on its first mortgage bonds due May 1, 1929, because it had no funds available, the examiner asserted. He said that he understood that mortgage foreclosure proceedings were instituted by Merchants Trust Company as trustee during 1930. Operating data set forth by the examiner showed that while the total number of customers and kilowatt-hours sold were greater in 1929 than in any previous year, the net income had not correspondingly increased. "It is interesting to note," he said, "that during the years 1928 and 1929 a deficit was suffered, which may be attributable to heavy increase in operating expenses due to corrections in methods of accounting." A breakdown of these expenses showed substantial increases in every principal class, the largest being in "miscellaneous general expense," which increased from $399 in 1927 to $12,615 in 1928.

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Public Given Access to Utility Reports

Rescinding administrative rule No. 11, in force since 1929, the Public Service Commission of Pennsylvania has given the public free access to the annual reports of public utility companies filed with it. Rule No. 11 limited the use of the reports to parties in a proceeding before the commission and to those persons who made written application setting forth adequate reasons in the public interest.

The commission stated that the regulation was adopted when holding companies were seeking to acquire operating companies and annual reports offered a source of information, so that the commission was swamped with requests for access to its files. In self-defense it was forced to adopt the rule. "This condition no longer exists," the statement said. "The commission, therefore, considers it wise to rescind this ruling. Hereafter any citizen may have free access to annual reports filed with the commission by public utility companies."

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November Financing Totals $35,200,000

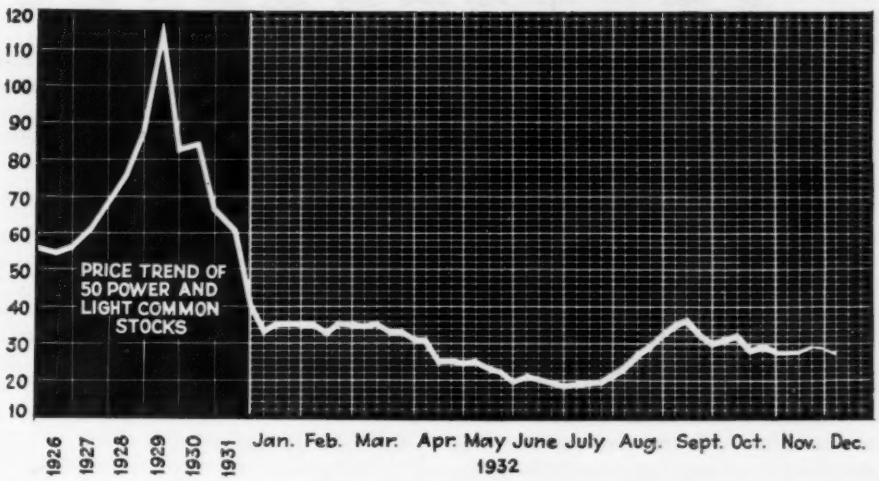
As the year draws to a close, utility financing shows a wide shrinkage from 1931's total. For the first eleven months of this year new security offerings by electric light and power companies amount to $400,503,800, as compared with $1,165,904,000 for the corresponding period in 1931. Only three new issues were offered in November, totaling $35,200,000. The preceding month's total of $60,000,000 involved eight issues.

The Toledo Edison Company's issue of $27,500,000, one of the largest of the year, was oversubscribed on the day of offering. The proceeds will go largely to retire outstanding bonds.

Name of Company	Amount of Issue (Par Value)	Period (Years)	Class	Purpose	Interest Rate	Price	Per Cent Yield
Louisiana Steam Generating Corp.†	$3,200,000	7	First mortgage gold bonds	To reduce indebtedness to holding company	6	95	6.90
Niagara Falls Power Co.	4,500,000	27	First and consolidated mortgage gold bonds, series A	To reduce indebtedness to holding company	5	99½	5.03
Toledo Edison Co.	27,500,000	30	First mortgage gold bonds	To retire bonds and for other corporate purposes	5	95½	5.30
Total	$35,200,000						

† A constituent company of Engineers Public Service Co.

Bonds and Stocks Recede Slightly



Slightly lower prices than were recorded in October brought the "Electrical World" bond index for November down to 91.8, as compared with 92.0 for the preceding month. Stocks also receded during the past week to 27.7, against 28.3 in the preceding week.

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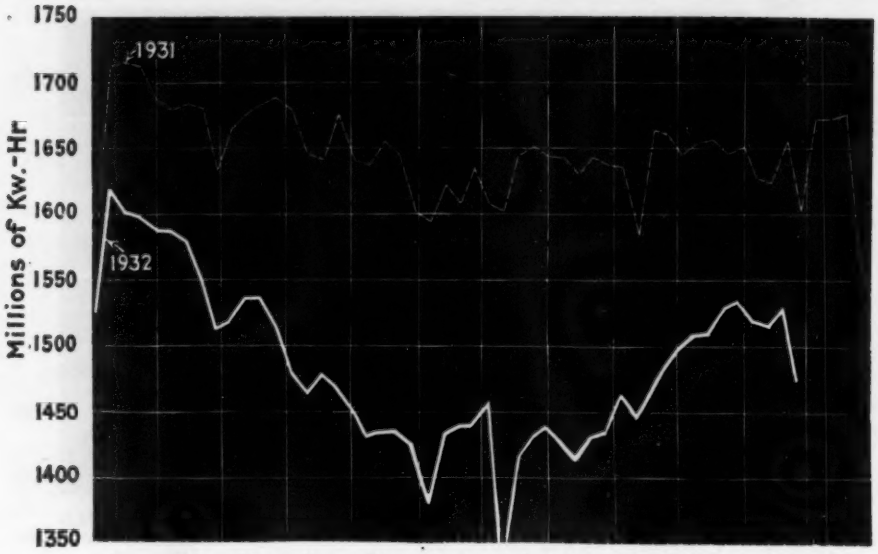
Less Output in Thanksgiving Week



Curtailment of the usual industrial and commercial activities on account of Thanksgiving Day brought a marked decrease in the electrical energy output during the week ended November 26, production being 1,475,268,000 kw.-hr. In the preceding week it was 1,531,584,000 kw.-hr. The decline differs but little from that of corresponding periods in the two preceding years and may be regarded as the normal effect of the holiday. The decrease from 1931 therefore remains almost unchanged; the rise from 7.5 to 7.8 per cent is negligible.

Regionally, operations on the Atlantic seaboard partially caught up with last year's. The change was especially strong in New England, where output had for several months been running much closer to 1931 figures than in other sections of the country. The Central industrial area stands lowest, but makes a better showing than last summer.

Weekly Output, Millions of Kw.-Hr.

Week Ended	1932	1931	1930	1929
November 26	1,475	1,600	1,672	1,718
November 19	1,532	1,655	1,722	1,818
November 12	1,521	1,623	1,713	1,794
November 5	1,525	1,628	1,728	1,798
October 29	1,533	1,652	1,741	1,816

Per Cent Change from 1931

Region	Week Ended Nov. 26	Nov. 19	Nov. 12
Atlantic Seaboard	— 5.6	—7.0	— 3.2
New England alone	— 3.7	—7.4	— 1.0
Central industrial	—10.2	—9.2	— 8.9
Pacific Coast	— 7.9	—7.6	—10.9
United States	— 7.8	—7.5	— 6.3

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Detroit Edison Opposes Rate Cut Plea

In a brief filed at Lansing, Mich., the Detroit Edison Company has demanded that the state Utilities Commission dismiss the city of Detroit's petition for a complete audit and appraisal of the company and a temporary blanket reduction in rates of at least $2,000,000 annually (ELECTRICAL WORLD, November 12, 1932, page 644). The Edison company states that per kilowatt-hour operating costs have increased 15 per cent since 1929. It adds that the company's city taxes have been increased by nearly $900,000 in two years and that its uncollected bills are from three to four times as large as in 1929.

"The company," the brief states, "has had to put its employees on a five-day week where possible, decrease appropriations to its retirement reserve, reduce its dividend rate from 8 to 6 per cent and draw on its surplus to keep going." The return on its investment for the twelve months ended June 30 was put at 3.68 per cent. The company estimates that its surplus, cut by more than $2,000,000, will be reduced by $2,500,000 more in 1932. Gross revenue for the year ended June 30 was $2,393,555 below that of 1931.

It is pointed out by the company that it has made voluntary reductions that have resulted in a rate lower than they were before 1920, when the city consented to a temporary increase. It states: "Our position is that no honorable public utility can co-operate with a city administration which is in so much trouble and under such mischievous control as is the present administration of Detroit. Utilities are required always to keep sufficient forces to maintain adequate service. Fixed charges are very high for utilities as compared with private business and they cannot be decreased during periods of depression. No probable cause has been shown for incurring the expense incidental to the ordering of an inventory and appraisal of the company's property."

Contention by the city that in his testimony before the commission President Alex Dow had admitted fixing rates by a "by guess and by God" method (ELECTRICAL WORLD, November 12, page 644) is refuted in the company's reply by the statement that the record shows that Mr. Dow had reference only to the original power rate of the Edison Illuminating Company which he found in force when he assumed the management of that company in 1896.

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Central Station Revenue Rose in October

Indications of further recovery of electric light and power company revenue are found in the returns thus far received by ELECTRICAL WORLD for October operations. These show an average decrease compared with 1931 of 6 per cent, equivalent to a total revenue for the whole industry of $168,000,000, on the basis of $178,630,000 a year ago.

Since the monthly disparity compared with 1931, beginning with April, has been successively 6.4, 7.7, 8.0, 8.9, 9.3 and 7.5 per cent, it appears that the present 6 per cent constitutes a second upward step toward equality with the preceding year.

Operating and maintenance expenses of the same companies are 11 per cent under 1931, equivalent to $68,500,000 for the entire industry and leaving a balance nearly equal to that of October, 1931.

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Another Russian Power Project

Construction on another great power station, 280,000 kw., for Russia and of a plant for nitrogen production, located about 25 miles from Tashkent, marks the initial step in the development of the estimated 1,500,000 kw. of power resources of the Chirchik River. Station and plant are to be completed by 1935. The work includes the construction of a dam second in size only to Dnieproges.

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25-Mile Light Beam Conversation

Extending the experiment of talking on a beam of light, as demonstrated before numerous electrical meetings and conventions during the past few years, over distances of a few hundred feet, John Bellamy Taylor of the General Electric Company succeeded last week in maintaining a conversation for fifteen minutes over a searchlight beam which found a 30-in. target, on a mountainside location, 25 miles from its point of origin.

Merchandising by Utilities Attacked by Ohio Retailers

At a recent conference of representatives of the Ohio Council of Retail Merchants, the Ohio Retail Dry Goods Association, the Ohio Retail Furniture Association and the Ohio Hardware Association an amendment to the Ohio public utility code was suggested, prohibiting public utilities from engaging in merchandising. These associations plan to submit the amendment to the General Assembly, which meets next January.

"Reports of complaints from practically every section of the state except Cleveland," George V. Sheridan, director of the Ohio Council of Retail Merchants, said, "indicate that gas and electric companies are steadily increasing their sales of household merchandise and are resorting to unfair and ruinous competitive methods which the legitimate merchants of the state cannot meet. The unfairness of this competition lies in the fact that the state guarantees the public utility company a profit-producing rate on its service monopoly. They charge to their general operation expenses huge losses sustained in their retail operations. They then capitalize these retail losses in their demands either for increased service rates or the maintenance of their present high consumer rates. In comparison, the non-subsidized retail merchant is compelled to secure a legitimate profit from the sale of his merchandise . . ." Mr. Sheridan pointed out that the Cleveland Electric Illuminating Company does not engage in merchandising.

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New York Metal Prices

	Nov. 22, 1932 Cents per Pound	Nov. 29, 1932 Cents per Pound
Copper, electrolytic	5.375	5.25
Lead, Am. S. & R. price	3.00	3.00
Antimony	5.75	5.75
Nickel ingot	35.00	35.00
Zinc, spot	3.50	3.50
Tin, Straits	23.30	22.50
Aluminum, 99 per cent	23.30	23.30

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Rental Plan Increases Central Maine Revenue

More than 200 electric water heaters are operated on a rental basis on the Central Maine Power Company's system in addition to about 800 units which have been purchased by customers. In commenting on the success of the plan George S. Williams, vice-president and general manager of the company, has stated: "On a conservative estimate as a result of our several water heater campaigns and rental plan, we now have better than 1,000 50-gal. storage type water heaters operating on the Central Maine system, and with an average income of $66 per heater we can safely estimate that we are getting an increased gross of at least $66,000 per year which we otherwise would not have received."

An analysis of 72 bills from 20 rental purchase customers in one division of the system shows an average increase of $5.53 after installing heaters.

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French-German Syndicate for Electrical Equipment

That electrification may aid European countries to strike off the shackles of trade stagnation was intimated in the radio broadcast of Raymond Patenôtre, French Under-Secretary of State for National Economy, last week. Mr. Patenôtre spoke of a possible Franco-German syndicate of companies engaged in manufacturing electrical equipment and supplies as being in prospect.

This new syndicate would, among others things, undertake to promote railroad electrification in many European countries, involving, it is said, the expenditure of some $650,000,000.

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Electrical Trade Improving, Dun Survey Shows

That the electrical supply trade is in a somewhat better condition than it was during the early months of the year is the opinion expressed in the current issue of *Dun's Review*. Even with seasonal influences stimulating certain departments, it is stated, however, the 1932 sales total from a unit standpoint is expected to show a decrease of at least 8 per cent, when compared with the figures for the year preceding.

The general insolvency record of the supply industry is reported somewhat more favorable than it was a year ago, defaults numbering 188, with liabilities of $4,365,439 during the first ten months of the current year, comparing with a total of 217, with involved liabilities of $4,822,234 for the entire twelve months of 1931. The improving trend, however, as shown in the special compilation of R. G. Dun & Company, has been confined almost entirely to the manufacturing division of the industry.

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California Water District Orders for Aqueduct Power

Contracts for the construction of 75 miles of power supply lines and substations to be used in connection with building of the Colorado River aqueduct by the Metropolitan Water District of Southern California have been awarded. Work to be done under the accepted bids includes construction of 45 miles of 66,000-volt transmission line and 30 miles of 33,000-volt line, with the installation of substations and transformers. The lines are to be used for the transmission of power from Colton, Calif., to points along the aqueduct line during construction. Electrical energy for pumping after completion of the aqueduct will be furnished from Hoover Dam. Involved are $42,785 for transmission lines and $48,414 for substations, $14,180 for cedar poles, $2,580 for pin type insulators, $8,255 for treated poles, $12,180 for suspension insulators, $66,200 for copper conductors.

Major New Construction This Week

Power plant (5,000 hp.), electric pumps, heavy-duty motors, electric mining machinery, conveyors, etc., required for sulphur mining and producing plant at Grande Ecaille, La., of Freeport Texas Company. Estimated cost $1,000,000.

Machine drives, heavy-duty motors, regulators, transformer equipment, etc., will be installed in steel mill of Mercer Tube & Manufacturing Company, Sharon, Pa. Cost about $75,000.

Until December 14 bids being asked by general purchasing officer, Panama Canal, Washington, D. C., for fractional-horsepower motors, 14,000 ft. cable, 10,000 ft. copper wire, 1,002 insulators, field rheostats, mercury contact type switches, magnetic switches, etc. (Schedule 2815).

Amherst, Ohio, having plans drawn for city-owned electric light and power plant. Bond issue of $100,000 authorized.

Heavy-duty motors, transformer equipment, compressors, electric pumps, etc., for refinery of Cosden Oil Company, near Big Springs, Tex. Cost over $200,000.

Motors, machine drives, switchboard panels, electric refrigerating machinery, conveyors, etc., will be installed at Excelsior Brewery, Brooklyn, N. Y., operated by Kings Brewery, Inc. Work also includes new power plant. A $1,000,000 project.

Plans under way by Northern States Power Company, Minneapolis, Minn., for extensions and improvements in hydro-electric generating plant at St. Cloud, Minn., including installation of direct-drive type waterwheel and accessory equipment. Program scheduled to start early in 1933.

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G. E. Plastics Division Busy

The plastics department of the General Electric Company, at Pittsfield, Mass., is being operated 24 hours a day with prospects of continuing at the present rate until February or March of next year. The increase in business is due to the demand for molded parts.

Would Merge Japanese Utilities

Baron Seinosuke Goh, president Tokyo Electric Light Company, has declared the sole hope of the Japanese electric power industry to be a merger involving the five largest concerns in the country. These are Tokyo Electric Light, Toho Electric Power, Daido Electric Power, Nippon Electric Power and Ujigawa Electric. Merger talks are not expected to come to a head until the yen is stabilized, as the question of share ratios for the five companies would depend in large measure upon the quotation of the yen at the time the merger was consummated.

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Hazardous Location Code Change

Amendment to Section 3203, Article 32 of the National Electrical Code is announced which permits panelboards to be installed in class 1, hazardous locations if of the type approved for use in explosive atmospheres.

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Bauer Reports to Virginia League

Release has been made by the League of Virginia Municipalities of the report tendered it regarding rate situations in that state by Dr. John Bauer of the American Public Utility Bureau (ELECTRICAL WORLD, November 26, page 713). It is therein contended that rates to domestic users and municipalities "are far out of proportion with present costs and purchasing power" and should be substantially cut.

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Purchase of Ohio System Approved

Authorization has been granted the Ohio Power Company by the State Public Utilities Commission to purchase for $2,522,213 the electric distribution and transportation properties and business of the Southern Ohio Public Service Company and to capitalize the purchase by issuing 504,422 shares of no-par common stock at $5 a share. The property to be transferred excludes the generating plant and the property operated under federal license.

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Kansas City P. & L. Reduces Rates

Reductions in the rates of Kansas City Power & Light Company to approximate $250,000 annually have been filed with the Wisconsin Public Service Commission, effective January 1. This follows months of negotiations between representatives of the state commission, the city administration, merchants, real estate agents and officials of the company (ELECTRICAL WORLD, August 6, 1932, page 168) and will bring a reduction in energy costs to stores, apartment buildings and secondary power users. It also will give thousands of merchants and commercial users a final bracket of 2½ cents, which has been for some years in the residence schedule. The residence brackets stand at 6½, 4½ and 2½ cents, while the commercial brackets have stood at 6½, 4¼ and 3¼ cents.

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Out at Hoover Dam is being done a job larger than the Egyptian pyramids. It is being done in a few years, instead of in several lifetimes — by electric shovels and cableways and other machinery, instead of by an army of straining slaves, bleeding under the lash. The equivalent of the machinery on that construction job, in terms of human labor, would run into figures that would look like the census, and yet machinery has not robbed that vast imaginary multitude of work; for with hand labor the enterprise could not have been thought of and, even as it is, there is a very respectable city of workers on the spot.

S. M. KINTNER,
Vice-President
Westinghouse Electric & Manufacturing Company

[Mr. Kintner, speaking recently on "Labor-Saving Machines Make More Jobs," contended technical progress to be hard at work, creating good new jobs by the million for tomorrow, not only in new lines but in old ones.]

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Indiana Commissioner Quits

Relinquishing his position as of December 1, although serving on a term which would have expired May 1, 1935, Commissioner Harry K. Cuthbertson of the Indiana regulatory board has greatly simplified the problems of Governor-elect Paul V. McNutt, who has promised to oust the whole commission (ELECTRICAL WORLD, November 26, page 712).

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Chats Falls Damages Asked

Alleging damages to its property with electric power development in the Ottawa Valley following the change of water level in connection with the Chats Falls development of the Hydro-Electric Power Commission of Ontario and the Ottawa Valley Power Company of Quebec, the Kingdon Mining & Smelting Company asks $2,400,000 compensation.

Would Oust Missouri Utility

Sikeston, Mo., whose petition to oust the Missouri Utilities Company (ELECTRICAL WORLD, September 24, page 386) was denied by the State Supreme Court, has asked the Missouri Public Service Commission for an order directing the company to cease operations within the city limits on the grounds that it is operating without a franchise and that there is now no public necessity for its service because of the existing municipal plant.

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Louisville Service Charge Protested

In a petition filed in the Jefferson Circuit Court, Louisville, Ky., the Kleinsteuber Boiler Works has requested a refund from the Louisville Gas & Electric Company amounting to $1,316.50. Attorney for the petitioner stated that there are 100 lawsuits pending against the utility based on the company's 50 cents per horsepower minimum monthly rate, which was established, he said, arbitrarily and in violation of provisions of the franchise granted the company in 1913.

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A Municipal Santa Claus

Just as a Christmas present to themselves the citizens of Andover, N. Y., will receive free electricity during the month of December. The municipal plant in that community will present all bills for that month marked paid.

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Liberals Hit Private Power

Ontario Liberal Association, during its annual convention at Ottawa, in a resolution reaffirming its adherence to the principle of publicly owned and administered hydro-electric power, including the sources of power as well as its distribution, condemned "the improvident and disastrous agreements by which the province has been saddled with the purchase of huge quantities of electric power from privately monopolized sources, at excessive prices, extended by a long period of years and vastly in excess of present requirements."

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Swedish Hydro Projects to Be Pushed

Two large hydro stations for Sweden are now under construction. The Krangede Power Company, in northern Sweden, will supply energy to a number of leading industrials, as well as to the State Railways and to the city of Stockholm, with an eventual capacity of about 180,000 hp. The main power line of this plant will have a length of 204 miles and operate at 220 volts, the highest voltage in Sweden. Construction was begun in 1931. Vargoen station is being built by the government Water-

falls Department to utilize the water of the Vaenern Lake. The maximum capacity of this plant will be 30,000 hp. Vargoen was begun in 1928 and will be completed in 1934.

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Army Engineers Survey California Water Project

For a week U. S. Army engineers surveyed the possibilities of California's co-ordinated water plan for irrigation, power development and conservation. Last week at a public hearing various arguments were heard.

Paul M. Downing, vice-president Pacific Gas & Electric Company, warned that though he recognized the need of water conservation and indorsed the basic plan, the state engineer's estimates on revenue to be derived from power were too optimistic and he doubted the ability of the state to absorb the additional 1,217,000,000 kw.-hr. which would be thrown upon the market by the construction of the proposed Kennett Dam.

Mr. Downing refused to concede that his company would or would not be interested in purchasing power from the plant which might be constructed.

"I would deeply regret," said Mr. Downing, "seeing any project as large as this attempted without a careful consideration having been given to the economic features. I am fearful sufficient attention has not been given to the matter of where the revenue is coming from."

The plan would involve the construction of the $84,000,000 Kennett Dam on the Sacramento River and a $60,000,000 reservoir on the San Joaquin.

State Engineer Edward Hyatt has warmly advocated the project, but concedes that "unless the federal government can assist us in this project, by direct appropriation and financing, it will be long delayed."

Congress to get report

Upon completion of both field surveys and hearings Colonel William J. Barden, senior member of the War Department board of engineers, announced the request for $40,000,000 interest-free federal loans to finance the project, together with the report of his organization's findings, would be presented before the regular session of Congress next year.

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Lamp Equations Revised

In recognition of the changes which have taken place in the manufacture of tungsten-filament incandescent lamps and in the methods of lamp photometry which necessarily followed the Bureau of Standards has issued revised characteristic equations for large and small lamps of all kinds.

Rockefeller Center Orders Huge Conditioning System

Contracts for an air-conditioning system to cost more than $1,000,000 have been awarded by Rockefeller Center, Inc., to the Carrier Engineering Corporation. The system, said to be the largest of its kind ever planned, will be installed in the 70-story RCA Building, main unit in the midtown amusement and commercial development. In the summer season the battery of large refrigerating units will provide the equivalent of 3,000,000 lb. of melting ice a day, which is estimated to be about the daily hot-weather consumption of a city of 120,000 families.

Nearly fifteen miles of duct work and more than 1,000 outlets and returns will be required and in extremely hot weather these outlets will carry about 18,000,000 B.t.u. hourly from the building. The moisture removed from the air by dehumidifiers in summer will equal 700 gal. of water hourly. In actual operation of the system 300,000 gal. of water will be refrigerated each hour. One battery will serve the nine studio floors, from the third to the eleventh inclusive, and another will serve the basement, ground and first floors. Maxim-Campbell silencer and air filter will be installed for the offices of the remainder of the structure.

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Hoover Dam Relocated for 50 per Cent Increase

Not 1,200,000 hp. but 1,800,000 hp. will probably be the installed capacity of the combined power plants to be located at Hoover Dam because of recent changes in the plans. As the result of conferences between government engineers and contractors for power house equipment the dam site will be some 20 ft. upstream from its earlier planned location. The change was made necessary by space requirements of 60-60-cycle generators (ELECTRICAL WORLD, September 24, page 392) for Los Angeles.

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Madison Square Garden to Have Better Lighting

Contract for modernizing the lighting system of Madison Square Garden, New York, completion of which will, it is said, make the arena the best lighted in the country, has been awarded to the General Electric Company. With the improved illumination, increasing 3½ times the present illumination, it will no longer be necessary to drop the canopy of high intensity lights over the ring for boxing bouts, cameramen will be able to make pictures without the use of flashlamps and motion pictures can be made of pugilists in action, or even of a game of hockey, without bringing in a special battery of searchlights, as has been required in the past.

The new lights, 256 in number, will be concealed in the ceiling, 75 ft. above the floor, and will total 274 kw. "At present the Garden has an average illumination of 21 ft.-candles. With the new lights and reflectors the general illumination over the entire arena will be 72 ft.-candles, which is sufficent for motion pictures," R. E. Clisdell, illuminating specialist of the General Electric Company, declares. "And with all this light no one will suffer from glare. . . . There will be just an even spread of illumination all over the place, 20,000 times brighter than full moonlight." Installation of the new lights will be started at once and will probably be ready for use early in December.

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Transformer-Converters on Hungarian Locomotives

Adoption of the Kandó system of electrification has been decided upon for at least part of the 120 miles of double-track line (325 track-miles) of the Hungarian State Railways. The Kandó system, now in use on one section involving long grades up to 7 per cent, differs from that followed in any other railway electrification project. The advantages are high efficiency and low short-circuit currents.

The Hungarian electrification project is planned for completion in 1934 at a total cost of $8,540,000, of which there will be allocated: 75 per cent, substations, overhead line and locomotives; 12.5 per cent, changes in communication lines; 4.5 per cent, repair shops and depots for locomotives; 8 per cent, miscellaneous construction.

Energy is supplied to substations from one-phase taps to three-phase, 110-kv. power systems for general utility supply and railroad service. Each traction substation supplies about 30 miles of track and reduces the transmission voltage for catenary use to 16 kv. The locomotives take the single-phase, 50-cycle energy and convert it by means of a transformer-synchronous-converter unit to multi-phase, 1,000-volt energy for driving induction motors.

The converters run at 1,500 r.p.m. and their stators are placed in a case filled with transformer oil cooled by radiators on the outside of the locomotive. Rotors are water cooled by copper pipes in the rotor slots.

Driving motors consist of two cylindrical parts, one within the other, which in different combinations give various locomotive speeds.

EDITORIALS

L.W.W.MORROW
Editor

Power Board Suggests Federal Regulation

IN ITS annual report the Federal Power Commission recommends federal regulation of holding companies. It rightly points out that regulation has two vital aspects; the one is concerned with utility customers and the other with utility investors. The state commissioners at their recent meeting also reached this conclusion and stressed their ability to regulate for customer interests even though they intimated that the federal government should undertake to regulate for the interests of investors in holding company securities.

The Federal Power Commission states that the vital prerequisite to regulation is a knowledge of facts, and that once facts are available either the state or federal regulatory body is equipped to act intelligently. This is a sound statement and deduction, but we cannot agree with the commission when it says it is in a better position than the state commissions to act to protect both customer and investor interests for both legal and practical reasons.

REGULATION in the interests of customers starts with the customers. It is a matter of detailed, intimate and continuous knowledge of facts and many intangibles associated with the conditions found in a locality—conditions change, cold facts are but a part of the data needed to make intelligent regulatory decisions. In our opinion the state commission is the best organization to regulate in the interests of customers. Federal regulation would mean more expensive, less responsive, less intelligent and less expeditious regulation. A Washington bureau for any purpose has proved to be about the most ineffective, money-wasting and indecisive agency devised by the ingenuity of our political leaders.

But federal regulation to protect investors in holding company securities is proposed also by the Federal Power Commission. This idea introduces an element of "Blue Sky" legislation into regulation, for who can define a holding company and who can visualize a regulatory power that would control the activities of the investment trust or holding company? Many holding companies have a minor interest in the electrical industry, many are not concerned with operation or management of subsidiaries, many are bordering upon investment banks—all the top corporations of American business enterprises in all industries are holding companies of some type.

NO PRACTICAL solution for the regulation of the activities or security issues of these business giants has been found except the investment value of their securities and the recommendations to investors, based upon analyses, of banks, insurance companies and financial houses. More power to the Federal Power Commission in its ambitious wish to enter this realm of regulation; if it gets its wish it will have little time for other regulatory activities!

The light and power industry promotes and welcomes regulation. It believes regulation improves, protects and stabilizes legitimate enterprises and chastises those black sheep which attempt to do things that are unethical, that would injure the credit of the industry or that would blacken its service record. For many years the utilities have supported regulation and willingly,

have given the facts needed by regulatory authorities. They are in favor of the best and strongest possible regulation in the interests of customers and investors. But their experience indicates that state, not federal, regulation is the best type of regulation to use in an industry so intimately linked to local regions and so constantly changing in its activities in each territory. State regulation is advancing and improving; it is effective, and will be made more effective; it is responsive to changed conditions; it is a going concern and needs no federal tinkering.

Preserve centralized safety engineering

A SUGGESTION of the Massachusetts Department of Public Utilities to the Boston Elevated Railway that the road's safety division be abolished and the work taken over by the operating superintendents as a means of economy raises a point of interest to power companies. The intimation appears to be that centralized direction of public utility safety activity is a dispensable luxury. It is true that unless safety practices and habits of mind become a part of the daily routine of the individual employee, whether of a transit, power or communication company, little can be achieved in the way of accident prevention. As yet there seems to be no better way than by centralized safety administration to plan such work, see to it that practical standards of procedure are put into effect, establish and maintain employee interest in accident prevention and co-ordinate the lessons of operating experience on home and foreign properties for mutual benefit.

Safety engineering is a specialized job. It has a technique of its own, and on even medium-sized systems requires more time for its proper study and application than most operating superintendents can snatch from other pressing duties, no matter how great their sympathy with the cause. Such work should "head up" in a responsible quarter and not be diffused as to the general conduct of safety affairs. To decentralize this specialized and creative responsibility on any but very small properties would seem to be a backward step indeed. To economize on safety work is a mistake at best, but to destroy a safety organization is worse.

To the unemployed in the electrical field

WHETHER you are employed or unemployed, we believe the following thoughts may be of help in relieving suffering if they are adequately disseminated and applied. First of all, despite your predicament and past unsuccessful attempts to find a market for your services, you must not lose faith in yourself or the possibility of getting a job. If you do, your chances of succeeding will be greatly reduced. In the last three years we have met and talked with many unemployed—from presidents down the line—but we are still convinced that any one who has a service to render which will *net* his prospective employer adequate returns on his salary can get a position or make a sale, even in these days, if he presents his case in a proper manner to the right party.

Remember that few industries are interested in installing new equipment, and that the only way to interest them in your services is to indicate how your experience can help them operate what they have now more economically (i.e., reduce unit cost of production, spoilage and rejects). This is the approach to make to gain an interested audience and to sell your services. Always remember that the best way to help yourself is to figure out some way you can help some one else save or make money and then convince them of your ability to help do the job.

With this approach clearly, concisely and logically developed, the next step is to ascertain which industries will be most receptive to proposals. Industrial and business magazines will indicate which industries are in the best financial condition now. But many times it is the sick industries, grasping for straws, which will be most responsive to helpful ideas. On these attention should be concentrated. The names of companies in these fields, as well as individuals to approach, can be found in the various industrial manuals, directories, etc., available in most public libraries. Where a broadcast approach is the essential step to personal contact, advertising the problem to be solved, the recommended solution, and evidence of its economical practical nature, serves to break down barriers to personal approach. Salesmanship for employment calls for selling ideas or services for the benefit of the buyer.

State Commissioners Solve Regulation of Holding Companies

By ARCHER E. KNOWLTON
Associate Editor ELECTRICAL WORLD

State boards find means at hand to protect consumers against abuses of centralized control.
Commissioners still groping for formula to fix fair value.
Rate negotiation procedures win favor.
More of costs of regulation will be charged back to utilities.

HOLDING companies are going to be regulated, somehow. Reproduction-new appraisals are to be given less weight, somehow, and in spite of Smyth vs. Ames and the decisions since that precedented one which emphasized them by putting stress on present value. Appeal to federal courts will only follow exhaustion of the remedies in local courts. Rate adjustments are to be arrived at more and more by negotiation and conference. Value of service on a competitive measure and the general trend of price levels are both to influence rate rulings more in the future. Depreciation as a physically visible phenomenon and depreciation as an accounting adjustment are to be more clearly differentiated. The costs of regulation in the future are to be met by assessment on the corporations which are regulated. These are some of the trends discernible from the discussions which took place at the convention of the utilities commissioners at Hot Springs, Ark., week before last.

Dominant in certain of the sessions was the plight of the railroads, subjected as they are to intensive and extensive regulation but struggling to meet competition which is either largely unregulated or even fostered by public caprice or by governmental encouragement and subsidy. The mistakes that have been made by railroads in finance and in capitalization and in public policy, as well as the defects of divided authority in regulation, are manifest. These naturally flavor the thinking of the regulatory bodies in connection with other utilities. First and foremost is the determination to free the operating utilities from all semblance of subversive influence of the holding companies. Pending the framing and passage of more laws like those of Wisconsin and Alabama, the commissions are apparently set on requiring the operating companies to justify as fully all expenditures made to parent corporations or affiliates by way of fees for services of any sort, as they are now in general required to do with their rates and revenues from customers. Regulation of the two past decades has focussed on the reasonableness of the collections from customers. In the period ahead there will apparently be equal attention to the outgo in order that the fair net existing as a difference between the two may be fixed with equal accuracy at its upper and nether boundaries.

Boards will act without waiting for laws

If necessary to go to extremes to ferret the reasonableness of expenditures this will be done, even to the extent of prohibiting payments of service fees to holding companies or disbursement of dividends until the commissions are assured that integrity, equity and prudence are written into the transactions. The commissions seem to look upon the holding company as a mechanism devised for the meritorious objective of financing and consolidating a blooming industry, effecting great savings as a result, but too readily perverted to retention of an unconscionable share of the benefits gained. To date they have found little in law to support their desires to restore equity for the consumer. The laws are now forthcoming, and pending their more general promulgation and elaboration the commissions are likely to use strong-arm tactics to put the operating company on the defensive with regard to justifying its obligations and its payments to parent and affiliated organizations. If these measures represent a further intrusion into managerial prerogatives, they are nevertheless viewed as excusable because the transgressions of the industry here and there easily transcend any inherent lust of the commissions for more power of inquisition.

Two resolutions were adopted by the association which epitomize the entire thinking with regard to the problem of the holding company and the most logical area of federal entrance into regulatory activities. One submitted by Commissioner Mayland H. Morse of New Hampshire was as follows:

Whereas the relations between some utilities and certain holding companies and other affiliated interests have presented problems to state commissions having jurisdiction over public utilities, and

Whereas legislation to enable state regulatory bodies to supervise and regulate the relations between utilities and affiliated companies or other interests is, in many states, non-existent or inadequate, and

Whereas the lack of such legislation has made possible the practice of certain abuses by holding companies and other affiliated interests, contrary to the best interests of the utilities and of the public, and

Whereas the existence of these abuses and the public knowledge of them has led, in some quarters, to a demand for federal regulation, and

Whereas it is the sense of this association that the powers inherent in the states should be fully developed and exercised without being delegated or surrendered to a central bureau, and

Whereas it is our responsibility to indicate improvements which are needed in our laws so that they may keep pace with

modern corporate development and continue to protect the public interest; now, therefore, be it

RESOLVED—That this association favors the enactment of comprehensive state legislation for the regulation and supervision of the transactions, contracts and other business arrangements and relationships between utilities and holding companies and affiliated interests.

The second resolution, advanced by Commissioner Hugh White of Alabama, defined the association's belief that a federal fact-finding agency would serve to enable the state commissions to protect the interests of utility customers in so far as they are adversely affected by external relationships:

Whereas the collapse of large utility holding and investment companies has aroused public interest in the problem of their supervision and control, and

Whereas the relations between holding companies and their affiliates and operating utilities have in many cases been inimical to the public interest and have led to public demand for federal regulation of such holding companies, and

Whereas this association is not convinced that general federal regulation of relations between utilities and their affiliated companies is necessary or desirable, but recognizes that state regulation may be greatly helped if the powers of the federal government can be utilized in determining facts as to relationships and business arrangements between utilities and affiliated interests; now, therefore, be it

RESOLVED—That this association deems it desirable and necessary that the facts as to the corporate and business relationships between holding companies or their affiliated interests and affiliated public utilities as to matters affecting the reasonableness of rates and charges made to the utilities for services or commodities or other purposes by a holding company or other affiliated interest be made available to the regulatory bodies of the several states, and that the executive committee and the committee on legislation be directed to support appropriate legislation to obtain these results.

As stated in the news account of the first day's session (ELECTRICAL WORLD, November 19, 1932, page 676) the line of demarcation is now more definitely drawn in the minds of the commissions as to the protection of the holding company's investors and the protection of the operating utility's customers. Costs of service to the customer can be adequately adjudicated by the commissions if they have a closer knowledge of the nature and the validity of all operating charges arising out of commitments to affiliated or parent organizations. The protection of the investor is, however, a matter of blue sky legislation jointly by the states and the federal government. With such a set-up there is little need visualized for a large federal bureau which would hamstring state regulation of utilities in the way that has transpired with regard to the railroads.

Further than this, the regulatory authorities are disturbed by the pleas for rate reductions from the public merely because commodity and labor rates are down. Commissioner Shaughnessy of Nevada emphasized the fact that railroad rates are 50 per cent above pre-war levels, while commodity prices are 50 per cent below. This makes a ratio of 3 to 1 as a relative price index and accounts for much of the rail carriers' inability to meet competitive transportation. Elimination of unproductive investment, write-down of capital, restraint of further heavy capital outlays to dodge recapture of excess earnings—these are all potential means of placing the railroads in a position to meet competition and survive by revivifying the spirit of aggressive salesmanship. Because of a long and meritorious history of voluntary reductions in rates electrical utilities have a much better before-and-after price ratio to their credit, but there has nevertheless been enough of the static character in rates since 1929 to prompt the commissions to respond in a measure to public clamor. In spite, therefore, of their recognition of the credit and solvency import of earnings on fixed capital, there was an undercurrent of discussion that points to the paring of capital obligations, at least in so far as swellings have come about through administration by holding companies. More than in many other businesses, it was claimed, the burden of utility capital charges is out of line with the price level, the income level and the consumption level of the day. How far this regulation spirit is applied depends on the counter tendency to recognize, as the public does not, the necessity of preserving in the utility corporation the capacity to render indispensable service and the ability to expand activities whenever consumption resumes its stride.

Reliance on reproduction estimates fading

Reproduction-new must, according to a long chain of court decisions affirming the Smyth vs. Ames ruling, be given weight in arriving at fair value. But the weight factor is nowhere defined by the courts and seldom revealed in commission decisions. Massachusetts, Oregon and Washington are committed to the prudent investment concept, but this is not yet the solution other states are willing to embrace. Maryland and Kansas are disposed to put emphasis on price trends and cost index figures as media for bringing original and incremental outlays into line with current values which the courts say shall rule. The reception given this proposal indicates that it would be well for the electrical industry to assemble the data which would give a true index of cost trends for the electrical plant as a whole and for its components. It is anomalous that the electrical industry trends should be inferred from a composite of trends taken from other utility industries, from government labor data and from the construction field devoted primarily to buildings and public works.

Incidentally, this question of valuation and the weight to be accorded the various estimates of value is to be moved nearer a reconcilliation of the needs of the commissions and the pronouncements of the courts. The District of Columbia commission has a peculiar status. It is authorized by law to ask the federal district courts for advice in advance of the rendering of commission decisions. The commission has taken advantage of this privilege in a wholesale manner. A query comprising 57 specific questions has been addressed to the district court for specific answers. The expectation is that the court will afford a comprehensive and unequivocal answer and that many of the gaps and backlashes between the mosaic of legal pronouncements of the past and the present economic and administrative needs of the regulatory bodies will be bridged. Thus regulation nationally will be enabled to move more expeditiously without the disconcerting fear of appeal and reversal. This proceeding in the District of Columbia Supreme Court is known as Equity 53,586, arising out of the rate negotiations with the Potomac Electric Power Company. As one commissioner put it, too much emphasis on reproduction estimates is the opposite of what regulation is supposed to accomplish. It attaches a definite speculative character to common stock, depressing it forcibly when price levels are low and elevating it unduly when prices

are high. The objective should be stabilized rates, based on a stabilized security structure.

Inhibitions on federal injunction desired

State regulation has been under a handicap because of the ease with which temporary restraining orders and temporary injunctions can be obtained from the lower federal courts. The commissioners find anomaly and injustice in the courts basing the refutation of legality of a commission order upon a record different from that on which the order was founded. Senator Johnson of California, at the instance of President Seavey and his colleagues on the California Railroad Commission, introduced into the last session a bill (Senate 3243) to amend the judicial code in such a way as to end the anomaly. The association adopted a resolution indorsing this bill in the view that no federal district court shall have jurisdiction to enjoin rate actions until the judicial remedies in the state of origin shall have been exhausted.

Depreciation theory and practice still remain in a confused state. Progress is being made in improving the technique as far as the telephone field is concerned. There is call for an exhaustive analysis of this topic in all its ramifications and Examiner Matthews of Wisconsin was prevailed upon to take the task of preparing such a treatise for presentation at the 1933 convention. He had stated that the allocation to depreciation reserve was generally inadequate to permit those reserves to perform their true function, and that this was especially true of companies which find themselves at a stage of maturity but with reserves incommensurate with the peak demands arising out of retirement requirements. There is also far too much tendency to confuse "per cent condition" with the annual percentage contribution to depreciation accumulations.

Trend is to assess regulation costs on utilities

With pressure for more effective regulation (one commissioner said that truly effective regulation would cost at least five times what it now costs) and pressure for reduced state budgets a new tendency arises, to assess the costs of regulation directly upon the utilities. Many states, more than is generally realized, already have such a provision in their laws, but it was Wisconsin which attracted fresh attention by enlarged and active application of the principle. Without, however, committing itself to the policy, the association did instruct a committee to draft a uniform law calculated to collect from the utilities all but the general overhead cost of regulation administration, which should continue to be borne by general tax funds.

This practice is not viewed so much as a path of least resistance in getting funds as it is a means of avoiding discrimination in taxation. The District of Columbia commission levies on the utility company an amount estimated to cover in advance the first 30 days' expense of any specific investigation. The limit to this and to subsequent levies is 5 mills on each dollar of gross revenue. Missouri, with 100 engineers at work on comprehensive valuation of all utilities, charges all costs back to the utilities without statutory limitation as to their magnitude. The commissions of Connecticut and Maryland were insistent that the association do not go on record as favoring the assessment of regulation costs on the utilities and they prevailed, without, however, aiming to prevent the drafting of a model law on the subject. Utility executives will find a detailed summary of the status of existing legislation on this topic in the proceedings of the association to be published shortly.

On the whole, one could not escape getting the reaction that the conservative and liberal commissioners have been drawn enough nearer together to have meliorated their late disposition to call one another names. Political upheaval and the signs of the times have shown them a common objective. This is not to say that regulation has acquired a standardized pattern. But it does say that individuality is less rampant. The stride is militant, as it always is when patriotism swells in defense of the homeland. Under the sting of threatened invasion by federal bureaucracy state regulation is finding itself. Unless all signs fail regulation is going to be more enlightened, more active, more vigorous, more expeditious, more effective, without, however, in general, becoming oppressive, radical or spectacular.

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Hairpin Loop Makes Arrester More Effective

By W. J. RUDGE, JR.
Lightning Arrester Engineering Division, General Electric Company, Pittsfield, Mass.

Some operating companies which have employed the hairpin loop or V-connection from line to lightning arrester attribute to it appreciable protective benefits. The loop involves a doubled lead to the arrester with strain insulator broken into the line wire. Recently available test data confirm the theory and account for the derived benefits. The greater the length of the T-connection replaced by the loop the more the added protection against a given wave. The steeper waves accentuate the additional virtues of the loop.

In the T-connection a division of the wave occurs at the tap and the voltage which passes the tap is impressed on the protected apparatus for a time interval equal to twice that required for the wave to travel from the arrester tap to true ground. The effect of the loop is to bring the line down to, or nearly to, the arrester terminal so that any incoming voltage waves must encounter the arrester before proceeding to other apparatus. This gives the advantage of allowing only arrester voltage to pass on to other apparatus.

Tests were conducted in Michigan with artificial lightning to determine the effectiveness of the hairpin loop, For the particular arrangement examined, the separation between the arrester and transformer was 90 ft. The single-lead tap (T-connection) from the line to the arrester was 30 ft. long. Voltage was measured at the transformer terminals for two-unit and six-unit "Thyrite" arresters. When a hairpin loop was substituted for the 30-ft. single-lead the reduction in voltage on the transformer was 15 kv. and 30 kv. respectively for the two arresters. These results are for a particular wave and for a particular separation of arresters and transformers.

It is questionable whether the use of hairpin loops having less than a 25-ft. drop can be justified. However,

where the margin of protection is small, there may be occasional cases where hairpin loops having drops from 10 to 15 ft. may be warranted.

Regardless of whether or not the hairpin loop is used, arresters should be located as close as possible to the transformers to be protected. Arresters below 69-kv. rating should be within 50 circuit-feet of the transformer and for circuits 69 kv. and above the arresters should be within 100 circuit-feet.

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Portable Oil-Conditioning Unit Saves Three Times Its Cost

By W. G. COPELAND

Management & Engineering Corporation, Chicago

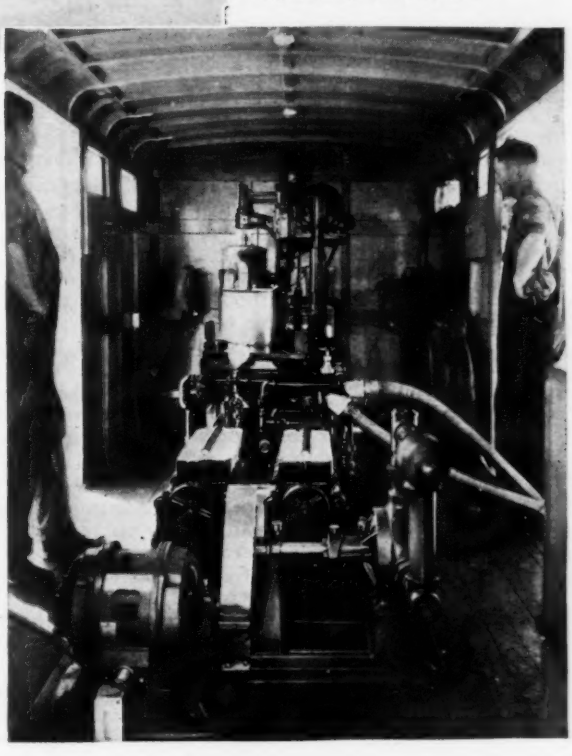
At a cost of $5,700 ($2,300 for the truck and body and $3,400 for the equipment) for a portable oil-conditioning plant, the Management & Engineering Corporation avoided the investment of about four times that amount that otherwise would have been necessary to care for circuit breaker and transformer oil in four new 132-kv. substations of the Indianapolis Power & Light Company. And there is a further saving since the unit is also used in conditioning oil at the smaller 33-kv. substations, where it does better and faster work than the usual portable blotter press.

Each of the 132-kv. substations will have ultimately 61,300 gal. of oil in seven 132-kv. breakers (36,400 gal.), seven 33-kv. breakers (2,520 gal.) and six 10,000-kva. transformers (22,380 gal.), and at each two 6,000-gal. storage tanks with piping to all apparatus are installed. The piping and valves are so arranged that dirty oil can be drained into one tank and a supply of clean oil kept in the other. Facilities are also provided for filtering from one tank to the other or for circulating the oil from the apparatus through the centrifuge or filter press and back to the apparatus without draining it. Near the tanks are suitable pipe risers and electrical receptacles to which the portable unit is connected.

The tanks are installed above ground. Telegages are provided to show the quantity of oil without leaving an opening to the air. In order to prevent passage of air into and out of the tanks due to temperature changes the tanks are equipped with Collins-Lane anti-breathers, consisting of U tubes of mercury which allow air to pass when the tanks are filled or emptied, but not under usual condition by breathing. This allows a supply of clean, dry oil to be kept on hand for emergencies. The piping, which consists of standard screw joint pipe, 2 in. to the apparatus and 4-in. return, is installed underground and covered with a standard covering of the type commonly used for cross-country oil and gas lines. This covering was thought necessary as the cinder fill used to grade the substation would otherwise have caused serious corrosion.

Ready to go

The truck body is 16 ft. long, 7 ft. wide and 6 ft. 6 in. high. On both sides are wide double doors, which, with a third in the rear, give plenty of ventilation for the hottest weather. Electric space heaters are provided for comfort in cold weather. The body is mounted on a 157-in. AA Ford chassis. With the dual wheels and drive the truck can go over almost any kind of soil under its own power. Consideration was given to the possibility of using a trailer instead of a truck, but the saving in money was very small. Being a self-propelled vehicle the truck can be taken anywhere by its operator, saving the time and expense of a truck and driver.



Plenty of room for working

In the foreground is the 5,400-gal.-per-hour transfer pump which is a Viking 2-in. gear pump driven by a 5-hp., 220-volt, three-phase motor. Directly ahead is a Sharpless 6 AB centrifuge rated at 1,000 gal. per hour, combined on the same bedplate with two Westinghouse B-10 filter presses. This combination is light in weight with easily handled parts and is so piped that the centrifuge and filter press can be used separately or in series.

Excerpts from West Penn Range and Wiring Policy

Range Sales Policy

I.—West Penn Power Company is interested in adding to its lines the maximum possible number of electric ranges, regardless of who sells them.

II.—The company, therefore, encourages good merchants to sell electric ranges and will assist in certain definite ways, as follows:

(a) The company will continue promotional work through cooking schools, advertising and other means.

(b) The company will continue to make available to dealers the services of its home economics department to demonstrate ranges sold by them.

(c) The home economics department will conduct schools on electric cookery in its test kitchen, where complete facilities are available for the benefit of jobbers and dealers and their salesmen provided the necessary ranges for such a school are made available.

(d) The company prefers that dealers establish their own installation facilities. However, for the benefit of dealers lacking such facilities, the company will install ranges for a flat figure equal to the prevailing installation charge (at present $7.50), provided all ranges sold by the dealer are installed by West Penn.

(e) The company prefers that dealers establish their own range service facilities. For the benefit of dealers lacking these facilities, the company will place its service organization at the disposal of dealers.

1. Dealers must carry the necessary range parts and furnish these parts for any range to be serviced.

2. Defective parts will be returned to the dealers, who must handle any negotiations in reference to these defective parts with their supplier of ranges.

3. A charge of $1 per hour will be made for service men and 10 cents a mile for automobile mileage from the serviceman's headquarters.

4. The company will, of course, have no function in billing any service to the dealers' customers.

(f) To encourage electric range owners to use proper utensils, the company has, at times, offered well-designed, well-built aluminum utensils to range purchasers. Such offers have been made to customers of all range dealers. If the company has occasion to make similar offers in the future they will continue to be available to any dealer's purchasers, provided, of course, the ranges are used on West Penn lines.

III.—West Penn Power Company's merchandising subsidiary, West Penn Appliance Company, is a dealer in electric ranges. It is not set up to do a jobbing business and will continue to confine its efforts toward the sale of ranges at retail only. If deviation from this policy becomes necessary in any case the appliance company will sell to dealers at list price less 20 per cent, f.o.b. local storeroom. This list price will be the installed price of the range less the prevailing installation charge. At present this charge is $7.50. It will consign no ranges to dealers.

IV.—Some time ago certain representative range distributors established uniform dealer requirements. These have since been adopted by other distributors. West Penn Power Company indorses these requirements and believes their use will help develop a healthy, profitable electric range business. These distributors' requirements follow:

(a) The dealer must keep at least two ranges on display in his store, one of the low-priced and one of the high-priced line as designated from time to time by the distributor. If one of the display ranges is sold a replacement order should be entered promptly. It is desirable to have one of these ranges connected to an electric circuit.

(b) The dealer and any of his employees who may have occasion to talk ranges to customers must learn the story of electric cookery. They should be familiar with the operating costs, thus making necessary an understanding of the utility's domestic rate.

(c) It is recommended that the dealer maintain suggested prices plus the suggested connection charge and that no allowance be made for old ranges.

(d) While the dealer is not required to do newspaper advertising, he will be required to use at least two direct-mail campaigns each year of 100 or more names each; to use range window display material at least six weeks during the year and to have available manufacturers' descriptive pieces for customers' use.

(e) Dealers' service men will be given training in range installation and service work. They should know how to install a range, to connect and disconnect range elements, be prepared to check oven temperatures against thermostat readings, be able to replace defective oven linings and to repair and replace range thermostats.

(f) Dealer will be given a reasonable annual quota which he is expected to meet if he is to continue as a dealer.

V.—West Penn Appliance Company has undertaken to handle range installations as outlined under II-d, service as outlined under II-e, range sales that may be made under III and will continue in its range sales policies, as in the past, to conform to the spirit of the range distributors' dealer requirements mentioned above.

VI.—West Penn Power Company believes that range dealers and their salesmen should use electric cookery in their own homes because of the advantages of electric cookery and because this will greatly aid in selling the idea to others. Most manufacturers allow the purchase of a range by a dealer or dealer's range salesman at a special price, usually much less than the wholesale price. More than 800 West Penn employees now use electric ranges in their homes.

Red Seal Wiring Policy

The company desires not to compete with electrical contractors in the installation of wiring. To that end, where Red Seal wiring is being installed, in all new buildings, and in those old buildings where the number of additional appliance and lighting outlets necessary to meet Red Seal requirement amount to 50 per cent or more of the number of such outlets previously installed, it will:

1. Furnish its standard 60-amp., three-wire combined meter switch and distribution panel, or the equivalent, without charge to the electrical contractor for each such installation.

2. It will pay $20 to the electrical contractor for each such installation.

3. The furnishing of the meter switch and distribution panel and the payment of $20 are contingent upon the installation passing Red Seal requirements (the installation of a range will be accepted in lieu of these requirements) and the owner's knowledge that the company has furnished the main switch and entrance. In case the wiring installation does not pass Red Seal requirements the main switch and distribution panel will be billed at the regular retail price of same, and the obligation to pay the $20 per installation will become null and void.

4. Each installation must include a range circuit of not less than three No. 8's and the use of the 30-amp. circuit positions in the combined meter switch and distribution panel as spares, or for heavy-duty heater circuits.

5. For each such range circuit the company will furnish without charge its standard receptacle. The use of any other receptacle must be at the electrical contractor's expense.

6. For the purpose of these requirements a multi-family dwelling will consist of as many installations as there are dwellings in the building.

Pedestrians should not be handicapped by night time so far as vehicular traffic is concerned on such streets. Night view on Euclid Avenue, Cleveland, after replacing old lighting system and equipment.

By

R. E. SIMPSON*

Illuminating Engineer
Travelers Insurance Company.

Inadequate Street Lighting Exacts Toll in Lives

THERE were 311,910 pedestrians killed or injured in automobile accidents last year. If in the course of one year the entire population of the city of Cambridge, Mass., were killed or injured the world would consider this a catastrophe of major importance. However, we would have to add the population of the neighboring cities of Lynn and Lowell in order to equal the number of automobile-pedestrian casualties last year.

The country-wide statistics assembled by the Travelers' Insurance Company disclose many pertinent facts regarding these casualties, such as the time and place of the accidents. We find the greatest number and percentage of pedestrian accidents occur between intersections, and the principal cause is the habit of crossing the street at points other than the regular crosswalks. This accounts for 29 per cent of the accidents. Closely grouped and ranging from 16 per cent down to 12 per cent are, in order, children playing in the street, pedestrians crossing where there is no traffic signal, crossing against the traffic signal and stepping from behind a parked car. Number six in rank is walking on or alongside rural highways. Although this accounts for only 4.5 per cent of the accidents it is responsible for 16.1 per cent of the fatalities.

Referring to national statistics, one point worthy of comment is the number of accidents occurring between intersections, where illumination, particularly on residential streets, is usually considerably less than at the street crossings.

Furthermore, the average driver does not expect to find pedestrians in the middle of a block, and therefore is not likely to be specially watchful for them. Considering the exposure, the accident rate between street intersections is exceptionally high, particularly at night time.

Turning now to state statistics, we find that there were 255 pedestrian fatalities in Connecticut in 1931 and we have detailed accounts of 249 of them. There were 158 fatalities during the hours of darkness, fifteen at dusk and 76 in the daytime. That is, the ratio of night to day pedestrian fatalities was two to one; this notwithstanding the fact that, according to the most liberal estimate we have seen, 80 per cent of motor-vehicle traffic occurs in the daytime and only 20 per cent at night. Therefore, one-fifth of the motor traffic accounts for more than three-fifths of pedestrian fatalities. The conclusion is inevitable that poor lighting is unsafe.

The crucial part of the day is the period from 5 p.m. to 8 p.m., which is daylight in the four summer months of May, June, July and August, but is dark during October, November, December and January. There were sixteen pedestrian fatalities in Connecticut in 1931 between the hours of 5 p.m. and 8 p.m. in those four summer months, while there were 54 fatalities during the same hours in the four winter months, an increase of approximately 350 per cent.

The towns having more than 10,000 population each comprising 78 per cent of the population had only 49 per cent of the pedestrian fatalities, while the remainder of the state (towns of less than 10,000 population each), with 22 per cent of the population, had 51 per cent of the pedestrian fatalities.

The standard of street lighting usually found in the smaller communities of the country is decidedly inadequate from a safety viewpoint, when measured by the standard of lighting on city thoroughfares.

**Excerpts from address before A.I.E.E., New York City, November 15, 1932.*

Bearing in mind the fact that trunk lines or main traffic routes pass through many of these smaller communities and, therefore, from a traffic viewpoint, one street, at least, in each town has the same classification as a city thoroughfare, the influence of the inadequate street lighting becomes evident from the following: In the Connecticut cities 53 per cent of pedestrian fatalities occurred in the daytime and 47 per cent at night. while in the smaller towns and rural sections 22 per cent occurred in the daytime and 78 per cent at night.

One significant feature of reports on rural accidents in another state is the fact that the percentages of daytime *accidents* does not even closely approach the percentage of daytime *traffic*, while the percentage of night accidents is nearly four times greater than is warranted by the traffic alone. The reports of drivers involved in pedestrian accidents on residential streets, rural highways and other poorly lighted roads are monotonously alike in one detail. Almost without exception the statement is made that the driver did not see the victim until too late.

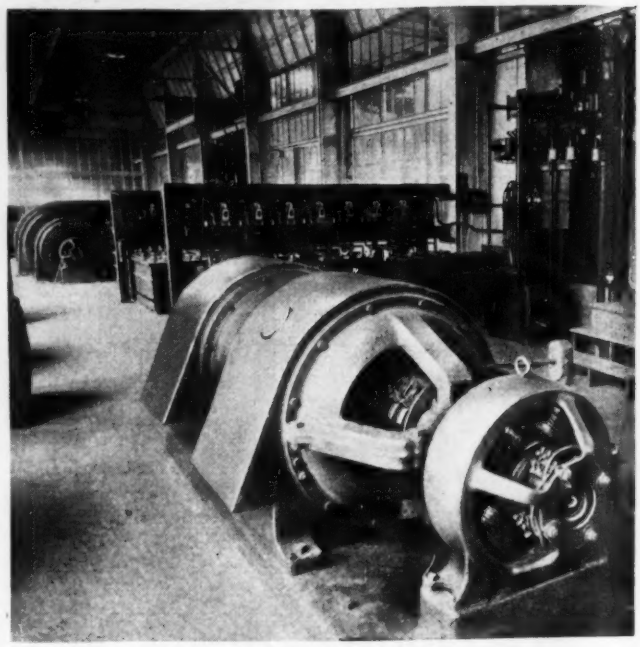
There are two closely related factors that enter into nearly all night pedestrian accidents, namely, speed and visibility. Better motor performance and better road surfaces invite high speed, and the invitation has been accepted to the extent that the average speed has increased nearly 50 per cent in the last few years. Visibility at night time has not increased in a corresponding degree, however. In fact, the more general use of headlights with 32-cp. bulbs tends to reduce visibility, because of the greater amount of glare from these headlights. As a result there is a marked tendency today to "outdrive the headlights," particularly when meeting traffic; that is, to drive so fast that it is impossible to stop the car or gain control of it within the distance or space corresponding to the visibility range of the headlights. It might be assumed that a general reduction in speed would eliminate this danger, but it would be impossible to prescribe a maximum speed that would be safe in all cases.

The most practical and effective remedial action consists in increasing visibility either by making radical improvements in headlights or by providing adequate street lighting, or both.

We have several hundred thousand miles of improved highway in this country. These are the main traffic arteries and bear the brunt of travel. To provide adequate highway lighting on these highways is a tremendous undertaking and would require several years to complete. There are, in addition, more than 3,000,000 miles of other highways which at the moment we cannot consider as a subject for highway lighting. Travelers on these highways must rely on automobile headlights for illumination. Their safety, therefore, will depend on the adequacy of the illumination and the freedom from interference with the vision of others provided by such headlights.

Thus there are two distinct fields, each requiring a distinct type of lighting, namely, fixed or highway lighting for trunk lines, and improved headlighting for the other highways. Every analysis we have made, as well as the analyses of others, emphasizes inadequate illumination or limited visibility as the outstanding cause of automobile accidents during the hours of darkness.

Motor-Generators Supplying Induction Furnaces



This installation is at the Barberton (Ohio) plant of the Babcock & Wilcox Company, discussed in the July 30 issue. The older set is rated at 150 kva., 2,040 cycles, 900 volts. The newer set is rated at 1,250 kva., 960 cycles and 1,800 volts.

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Italy Using More Electricity

Electrical energy consumption for industrial purposes in Italy has lately been on the increase, according to statistics covering the first seven months of the current year, reports Antonio Giordani of Naples. Total monthly consumption, including imported energy, rose from 768,739,000 kw.-hr. in April to 876,942,000 kw.-hr. in July. The increase is 14 per cent and is ascribed to the growth in industrial load.

It should be noted, however, that this change was smaller than in 1931 and that the consumption for the first seven months was slightly less in 1932 than in 1931—5,734,771,000 kw.-hr. and 5,757,414,000 kw.-hr., respectively. Water power provided 95.7 per cent of this; steam, 2.6 per cent; 1.7 per cent was imported.

Regional production from January to July, inclusive, of 1931 and 1932, not including the imports (99,442,000 kw.-hr. in 1932), is given in the accompanying table.

Regional Energy Production in Italy

Kilowatt Hours (000 omitted)

Region	1931	1932	Change
North Italy	3,984,740	3,970,812	— 0.35
Central Italy	958,948	962,734	+ 0.4*
Southern Italy	545,083	557,962	+ 2.4*
Islands	160,631	143,821	—10.4
Total	5,649,402	5,635,329	— 0.25

* Ascribed to the increasing use of electrochemical fertilizers, for which hydro-electric energy is used. Strong efforts are being made to increase the country's agricultural production. Success is held to depend on the more extensive use of fertilizers. Further increase of output in southern Italy is expected, because the large Sila hydro-electric plants in Calabria are under construction and will be completed in the course of the next few months.

Common Neutral Has Savings Possibilities

By L. J. CORBETT

Engineering Department,
Pacific Gas & Electric Company, San Francisco

AS ERRONEOUS impressions have been created in some quarters regarding the savings to be made by the use of a common grounded neutral wire in nominal 4,000-volt, four-wire distribution systems it may be well to reveiw briefly the results obtained in the recent trial of the system in California,* and to draw such conclusions as are pertinent from the experience obtained there and in other localities where it has been used.

Those who are familiar with overhead distribution practice will appreciate the fact that transformers of the same voltage and capacities will be used in the common-neutral system as in the ordinary four-wire system with separate primary and secondary neutral wires, both on the lines and at the substation. No differences will be necessary in the substation building, in any of the substation equipment or in the underground portion of outgoing feeders, except in some cases perhaps where the feeder neutral may have to be increased in size to conform to requirements imposed for the common neutral. The only savings, therefore, will be in the copper and its attachments, one less wire being used on the line. In the "backbone" section carrying all three primary phase wires, only six wires are needed in a common-neutral section served by one transformer, while seven will be required in a similar section of the ordinary two-neutral system. Similarly an open-Y run will require five wires on a common-neutral system as against six wires in the two-neutral system; a single-phase run, four wires as against five. The cost of neutral dead ends will be halved, as can be also that of transformer cut-outs if those on the neutral are omitted. Occasionally an available pin position may save or defer the reconstruction of a crossarm or even the replacement of a pole.

Costs increased by rigid grounding rules

In California rather rigorous grounding requirements were set up for the common-neutral system due to a desire on the part of the Railroad Commission to insure safety beyond any reasonable doubt. The extra cost of such measures over the cost of those necessary on the two-neutral system will lessen the possible economy by that amount. This is not written in criticism of that policy. If each area cut over to the common-neutral system were carefully studied by competent engineers, a grounding system with grounds at key locations could be designed which would insure safety as definitely, probably at less construction expense. State rules, however, must be easily interpreted and applied by the man in the field and the work must be readily checked, hence such rules must insure safety under a wide variation in field conditions. Time and experience may be expected to indicate if and to what extent such rules should be modified.

The trial of the system in California involved the cut-over of ten substation areas from about 2,300 volts delta primary to nominal 4,000 volts Y with common primary and secondary neutral instead of two separate neutrals as in the usual Y system. One area already served by a 4,000-volt, two-neutral system was increased by a branch area served by common neutral. The savings were thus necessarily calculated from the work actually done as compared to estimated costs which would have been incurred if in each case the two-neutral system had been installed.

Seventeen per cent of net cost saved

In the eleven areas recorded in the table, $33,075 was saved out of an estimated total cost of $308,453 which would have been incurred if the change had been made to a two-neutral installation. This is 10.7 per cent of the estimated gross cost, or 17.8 per cent of the net cost of a change to such a system after deducting the cost of the "rebuilds." The savings in the different areas varied from 4.3 to 15.7 per cent of the gross costs, or from 10.7 to 55.8 per cent of the net costs of a similar change to the ordinary two-neutral system.

A close inspection of the work in the various areas would no doubt explain the wide variation in these percentages. The cost of rebuilds can be expected to differ widely among the areas because of wide variations in age of plant as well as differences in state of preparation for the change at the substation. As to variations in the percentages of savings to net line costs, a number of factors may enter to influence the results. The work at Ventura, where an existing two-neutral Y system was increased by a common-neutral branch, the percentage of savings to net costs, 16.5 per cent, is consistent with what might be expected from comparative valuations. The savings in the other areas are seen to vary from 10.7 per cent to 55.8 per cent of what the net cost would have been if the change had been made to the two-neutral system.

In an area served by a delta system the change to a Y system with two neutrals would require the stringing of a primary neutral wire for the entire length of the primary lines. If the change were made to a common-neutral system in those sections already equipped with a secondary neutral wire large enough for the purpose this could be made use of, thus saving the cost of installation. In an area where transformers are few and far between and the secondary neutral is not continuous the savings would be small. In an area more fully served by

"Common Neutral Practice Confirmed in California," "Electrical World," June 4, 1932, also report of subcommittee on common neutral, Pacific Coast Electrical Association, "Electrical West," May 15, 1932.

Summary of Power System Costs and Savings

This table from the report of the subcommittee which studied the matter in California gives a summary of the change over costs and estimates upon which the savings were calculated. The second item in each column, actual gross costs common neutral is the total gross cost of the work done in the respective areas from the records of the power companies. The estimated gross cost which would have been incurred had the two-neutral system been used appears as the first item, the difference being the third item, savings by use of common neutral. Item 4 expresses these savings in per cent of gross estimated two-neutral cost of a changeover.

In each area cut over advantage was taken of the opportunity to replace deteriorated elements, faulty insulators, pins, crossarms, guys, etc., to change alignment or routing, to make a completed job. Such reconstruction would be included in any case, even if the change was to the two-neutral system. The cost of such work is listed as cost of rebuilds, either system, item No. 5. This amount deducted from the estimated gross and actual gross costs, items 1 and 2, leaves the estimated net cost two neutral and the actual net cost common neutral, items 6 and 7. The savings, expressed in per cent of the net two-neutral cost, form the last item in each column.

Items	Substation Area	Alhambra	Sub. No. 2	Sub. No. 1	Sub. No. 14	Moneta	Ventura	MiraVista (Richmond)	Chico	Linden	Laguna Beach	Palm Springs	Total
	Power Company	So. Cal. Ed. Co.	L. A. Gas & Elec. Corp.	L. A. Gas & Elec. Corp.	L. A. Gas & Elec. Corp.	So. Cal. Ed. Co.	So. Cal. Ed. Co.	Pac. Gas. & Elec. Co.	Pac. Gas & Elec. Co.	So. Cal. Ed. Co.	So. Cal. Ed. Co.	So. Sierras Power Co.	.....
1	Estimated gross cost—two neutral.....	$16,626	$49,809	$48,288	$48,007	$19,223	$4,748	$17,318	$28,734	$40,610	$21,958	$13,132	$308,453
2	Actual gross cost — common neutral.....	14,059	43,569	40,716	43,042	16,671	4,418	15,917	26,307	37,506	21,003	12,170	275,378
3	Savings by common neutral...	$ 2,567	$ 6,240	$ 7,572	$ 4,965	$ 2,552	$ 330	$ 1,401	$ 2,427	$ 3,104	$ 955	$ 962	$ 33,075
4	Per cent savings over gross two neutral cost.....	15.4%	12.5%	15.7%	6.2%	13.3%	7.0%	8.1%	8.4%	7.6%	4.3%	7.3%	10.7%
5	Cost of rebuilds, either system	$ 4,746	$20,162	$ 5,062	$ 9,963	$13,941	$2,748	$ 4,871	$ 6,144	$35,043	$14,081	$ 6,306	$123,067
6	Estimated net cost two neutral	$11,880	$29,647	$43,226	$38,044	$ 5,282	$2,000	$12,447	$22,590	$ 5,567	$ 7,877	$ 6,826	$185,386
7	Actual net cost common neutral	9,313	23,407	35,654	33,079	2,730	1,670	11,046	20,163	2,463	6,922	5,864	152,311
8	Savings by common neutral...	$ 2,567	$ 6,240	$ 7,572	$ 4,965	$ 2,552	$ 330	$ 1,401	$ 2,427	$ 3,104	$ 955	$ 962	$ 33,075
9	Per cent savings over net two neutral cost.....	21.6%	21.0%	17.5%	13.0%	48.3%	16.5%	11.2%	10.7%	55.8%	12.1%	14.1%	17.8%

transformers, with secondary neutral wires of sufficient capacity already installed on the same poles with the primary wires, the savings will of course be high. In some of the areas much of the secondary neutral wire was too small to meet the requirements for a common neutral so new wire of suitable size had to be strung and the old wire left for future use for other purposes or removed.

In the area studied no appreciable costs were incurred for measures necessary for co-ordination of power and telephone plant because of the change. In some situations such measures may become important and consideration should be given to their possible need.

In the long run the savings will be the difference in valuation of the common-neutral system and that of a two-neutral system which will serve the same area at the same voltage. These will approximate the general percentages suggested in an earlier paragraph, namely, from 14 to 20 per cent of the copper costs in the two-neutral system, plus some additional savings on neutral dead-ends and transformer cutouts and less some extra expense for grounds and possible co-ordination measures. The items which are affected—the copper, pins, insulators and cutouts—will vary in quantity in the different 4-kv. areas. Their costs will average from 10 to 12 per cent of the total distribution capital, and for proper perspective should be viewed in their true relation thereto. They are not sufficient to affect materially the rate base under present regulatory procedures, but they are appreciable in certain areas.

Immediate savings are realized in new distribution areas and in areas in which the service is being changed from delto to Y. In areas already served Y with two neutrals it would even be an extra expense to make the system conform to common-neutral requirements. Only as maintenance demands may permit such an area to be changed over gradually to common neutral through a term of years can ultimate economy be hoped for. The greatest savings, either immediate or ultimate, will be realized in those fringe areas which are fairly well built up and have high load densities, but are still served by overhead lines.

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To Stop Rain Leaks Into OCB Tanks

By J. ELMER HOUSLEY

Alcoa, Tenn.

Occasional trouble is experienced from leaks during rainstorms through the gaskets on large cover plates of high-voltage circuit breakers. A simple method of preventing such trouble has been used on fourteen 154,000-volt circuit breakers during the past few years. After completing the annual inspection and oiling of the mechanism in the top of each switch tank the gasket is replaced and the cover plate is tightened. Next the edge of the gasket is thoroughly coated with aluminum paint. The paint is freshly mixed in just sufficient quantity for the job in the proportion of 2 lb. of aluminum bronze powder to 1 gal. of spar varnish.

Transmission System Regulation Requires Local Load Capacity

THAT voltage regulating equipments and arrangements without capacity for assuming at least some portion of the local load are not sufficient to maintain a high quality of service on large-area transmission type systems may be deduced from the experience of the Iowa Public Service Company. The evidence appears in a paper by Merle W. Parr, presented at a recent meeting of the Engineering Section, Middle West Division, N.E.L.A. Induction regulators and power-factor corrective equipment, assisted in their task by existing small steam and hydro plants scattered about the system, proved inadequate to hold the voltage levels of the system in uniform planes. As loads increased and service voltage tolerances became narrower, it became necessary to increase the number of points of local generation by the installation of Diesel-engine plants. According to Mr. Parr:

"The western division of the Iowa Public Service Company system has had some unique and difficult system voltage regulation problems. This system, which supplies approximately 175 towns scattered over a large territory and having a relatively small demand, consists essentially of a 33,000-volt network with step-down substations located in the larger towns and lower voltage lines radiating from these substations to feed the smaller towns in the vicinity. Originally, the system load was supplied through three main substations connected to the base station at Sioux City by a 33,000-volt transmission feeder approximately 125 miles in length, which was designed and built for future 66,000-volt operation. The base station at Sioux City maintained a constant voltage on its 33,000-volt bus. The voltage regulation of the line was maintained by operating several small steam and hydro plants located near the end of the line to reduce the peak load and also by operating some of the hydro units as synchronous condensers.

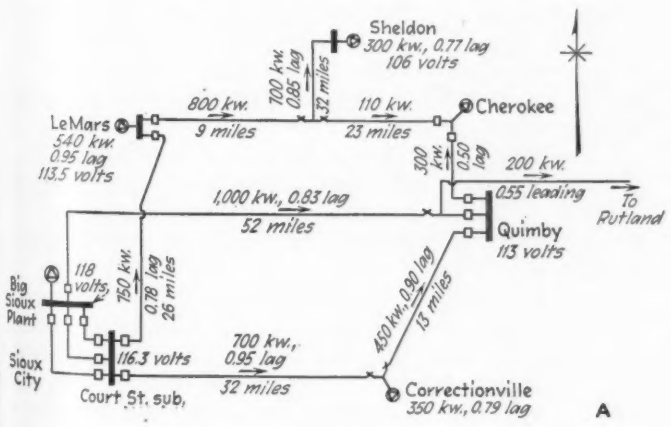
Local Diesel plants aid regulation

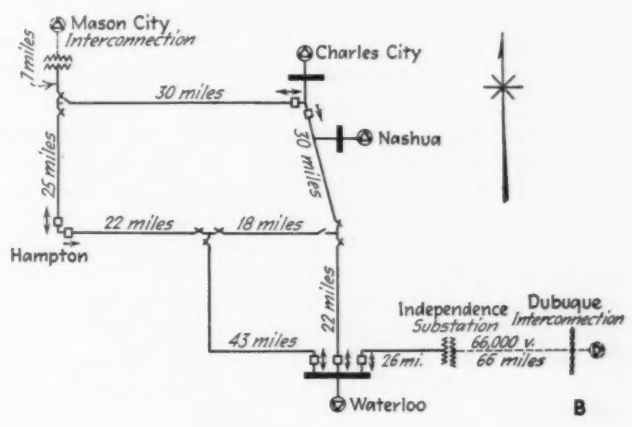
"As the load developed and service requirements became more stringent Diesel-generating plants were installed in some of the larger towns to reduce the peak loads on the transmission lines, to provide service protection to the local load in case of transmission line outages and to improve the voltage regulation. The usual arrangement at these Diesel-generating plants is to connect the generating unit to the transmission line substation or unregulated bus, and the local load on a bus regulated by induction voltage regulators. The substation transformer taps are then set so as to give a voltage lower than the desired regulated voltage. The generator units are operated with a normal field excitation, which will give about unity power factor for the load being carried. If the voltage on the substation or unregulated bus lowers during the peak-load periods this field excitation is increased up to the capacity of the generator or exciter, whichever may be the limiting factor, in order to carry as much of the wattless load on the line as possible.

"The generators were purchased with excess kva. capacity, and are operated nominally at about 75 per cent of their rated loads. Being located at the larger load centers on the system, a substantial improvement in voltage conditions is made by the reduction of the load on the transmission line and by the power-factor correction obtained at each of these generating plants. No definite policy is pursued regarding the use of Tirrill regulators on these small plant generators. Usually they are operated without the Tirrill regulators, depending on the transmission line to regulate the voltage on the generator bus and adjustment of the excitation by hand to give the desired wattless load on the generator. The principal objection to this practice of operating

Transmission systems braced with local generation

These east and west systems of the Iowa Public Service Company are maintained at adequately level planes of voltage regulation largely by the support afforded by strategically located small plants.





without the Tirrill regulators is that with the generator overexcited for power-factor correction the voltage may go excessively high in event of a circuit breaker opening in the transmission line. No study has been made on this system of the circulating currents between these various small plants tied into the system, but it is not believed that these are serious because of the high reactance of the interconnecting lines between the plants.

"Voltage regulation in many of the towns which are supplied by the transmission system and do not have Diesel-generating units is maintained by the use of induction voltage regulators. The substations at these towns are built with a regulated and unregulated bus. All sources of power are connected to the unregulated bus and all load is connected to the regulated bus. Where 6,600-volt and 13,200-volt lines are supplied from these substations the step-up transformers for these lines are connected to the regulated bus, making the one set of regulators serve the entire load supplied from the substation. Two single-phase, 2,300-volt induction voltage regulators are normally used. Compensation on regulators installed in this manner is of but little value, as the substation is normally located close to its principal load and the line drop from the substation to this load is small. Attempts to compensate for the load more remote from the substation results in excessive voltages to the load close to the substation.

"Further improvement in the system voltage regulation has been made by increasiing the capacity of existing lines and by paralleling lines together wherever possible. Diagram *A* shows the load and voltage conditions found by tests on a portion of the system where three 33,000-volt lines extending east from Sioux City are tied together at the Quimby substation. This test shows that by tying the Correctionville and Le Mars lines together at Quimby the main line has been relieved of a considerable portion of its load.

Interconnection improves regulation

"Different operating conditions are encountered on the system known as the east division of the Iowa Public Service Company. This system consists essentially of a 33,000-volt loop, as shown on sketch *B*. The base station is located at Waterloo, with other steam and hydro stations located at Charles City and Nashua. The system operates in parallel with the Interstate Power Company stations at Dubuque and is also interconnected with the United Light & Power Company station at Mason City. The voltage on the 33,000-volt bus at Waterloo is maintained constant, except that it is lowered from 119 to 116 volts between 10 p.m. and 7 a.m. in order to keep the voltage at the unregulated substation taps to the transmission system from becoming excessively high. The generating units at Charles City and Nashua operate at transmission line voltage and are normally overexcited to generate their capacity in kva. In addition to this power-factor correction, static condensers and 80 per cent leading power-factor motors are installed at the principal industrial sources of lower power factor on the system. For control of the wattless current between the interconnecting systems adjustment of the taps on the interconnecting transformers is relied upon. As these transformers are not equipped for tap changing under load the taps are set to give the best division of wattless current for the normal load transferred.

"Distribution in the larger towns served by the transmission line is at 2,300 volts and the voltage is regulated by induction voltage regulators. When it has become necessary to make changes in the smaller distribution systems for voltage improvements they have been changed from 2,300-volt to 6,600-volt operation. In addition to the reduction of line drop, the regulation to the 6,600-volt rural lines radiating from these towns is improved by the elimination of the additional transformation from 2,300 volts to 6,600 volts. When better voltage regulation is required it is planned to install 2,300-volt regulators operated with 6,600-volt series and exciting transformers.

"In order to keep a constant check on voltage conditions throughout the system recording voltmeters are installed at more than 50 different points, and these charts are sent daily to the system operators. Records are kept of all substation transformer tap settings, and at some of the more important points curve-drawing ammeters and wattmeters are installed to aid in checking the system operation."

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More Answers Like This Needed

Commenting on the editorial in the October 22, 1932, issue of ELECTRICAL WORLD entitled "The Domestic Market—All Talk and No Sales," the Electric and Radio Association of Kansas City, Mo., concentrates on three excerpts:

> Progress is very slow, there is much talk and little selling, and the industry is not gaining much ground in its competition for the consumer's dollar. . . . Not in years has there been so little agreement as to what to do to build up sales organizations, or so little actual sales pressure in the marketplace. . . . The only way to sell is to go after the business according to methods that both experience and good judgment indicate to be sound.

"Very good, Mr. Morrow," it replies, "and more power to you in your constructive efforts. But we do want you to know that here in Kansas City, Mo., all branches of the electrical and radio industries are co-operating through a long-established electrical league. And this year, in spite of a greatly curtailed budget and increased difficulties in obtaining funds, concerted sales efforts, based on experience and judgment, have been and are being used.

"For example, in the spring seventeen refrigerator and range distributors, co-operating with the Kansas City Power & Light Company, conducted a beautiful Electric Refrigeration Exposition and Cooking School, with an attendance of 7,700 in the main exhibits and 4,360 in the cooking school.

"Then, from July 14 to August 31, fifteen refrigerator distributors, with the same utility, spent $2,000 on a 'current coupon' electric refrigerator campaign, in which the electric meter readers distributed 94,000 folders to residential users.

"And in October thirteen radio distributors, again with the utility, launched a co-operative newspaper advertising campaign to focus attention on the merits of the new 1933 radio sets. An interesting feature of this campaign, which is expected to continue for some time, is a copy-

righted tag which is featured in the newspaper advertising and used by dealers for certifying the new sets.

"Again, a special committee, after weeks of effort, tied the industry in with the annual inspection of buildings, made by the city's Fire Department during National Fire Prevention Week, and for the first time, the department really inspected and issued correction orders on existing electrical fire hazards. Just prior to the inspections 108 fire captains and lieutenants, with members of the Underwriters' Fire Patrol, were given laboratory instructions on the most common electrical fire hazards.

"And in regard to that greatly discussed need of adequate wiring in the residential field, we admit difficulty in the old-homes market, but feel a definite responsibility to at least try to get every new home and every new apartment suite adequately wired. We believe the best way to do this is by a continuous day-in-and-day-out effort and, so far, have found nothing that is so satisfactory in that respect as the Red Seal plan. Through it 32 per cent of all new residential family units (homes and apartments) the past four years, and 70 per cent the past two years, have been adequately wired for the convenient use of electricity. (Incidentally, why doesn't the industry give the Red Seal plan the recognition it deserves?

"There are other ways, Mr. Morrow, in which the industry here in Kansas City is co-operating to better itself and, at the same time, render a real service to the public, but we think enough have been mentioned to let you know that in this community there is not only talk, but real concerted, co-operative sales efforts directed toward constructive accomplishments."

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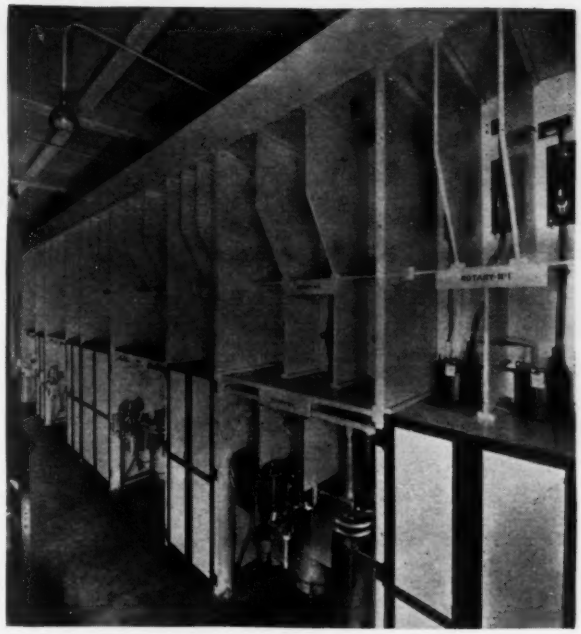
Asbestos Lumber Replaces Concrete in Bus Structure

By OSCAR J. ROTTY
Superintendent of Substations
Union Electric Light & Power Company, St. Louis

Costing about the same as concrete for its first installation in the new Fifteenth Street substation of the Union Electric Light & Power Company, the use of asbestos lumber for bus and switch structures is expected by the company to reduce materially the cost of such structures in succeeding stations. The reduction will be because of the elimination of form work. The economy of this was absorbed in the first installation by development and design expense. A typical "built-up" section was constructed for test and subjected to loading and impact tests before the design was approved.

The structure contains the 13,800-volt bus, the two incoming feeder potheads, oil circuit breakers, disconnecting switches, current and potential transformers and fusible disconnects and the two machine oil circuit breakers, disconnects, instrument transformers, fusible disconnects and motor-generator running breaker. The oil circuit breakers are frame-mounted and supported from the floor. All other parts are mounted on the asbestos structure. It is 47 ft. long x 3½ ft. wide and 18 ft. high. Despite its narrow base and rather great height it is perfectly rigid and solid. The back wall of the structure is spaced out 2 ft. from the building wall



Bus structure is asbestos, not concrete

by a steel framework to permit the installation of main ducts, control conduits, grounding wires and other materials which would be imbedded in concrete in the standard concrete structure. For the major high-voltage conductors fiber duct would have been used in the standard concrete structure, but because of the fire hazard transite pipe was used in this case.

All walls, barriers, horizontal slabs and other parts of the structure are made of asbestos lumber. The main partition walls between feeder or machine positions (called wing walls) are designed to carry the load of the bus compartments at the top of the structure and are of built-up sections. These sections are made up of two standard corrugated asbestos sheets placed together, but with their corrugations running at right angles, and then with a ½-in. thick flat sheet placed on each side of the corrugated sheets. These four sheets are held together with $\frac{5}{16}$-in. flathead screws and special flathead sleeve nuts placed on approximately 12-in. centers each way, with the screw heads and nuts countersunk and the holes plugged. Where it is necessary to "splice" the built-up sections the corrugated sheets are stopped about 6 in. short of the splice and a splicing strip of solid asbestos lumber of the proper thickness and 12 in. wide inserted to bridge the splice, thereby concealing the splicing strips and making the splice appear only as a joint in the flat sheets. The horizontal slabs are built up in a similar manner or else use only one corrugated sheet instead of two, according to the loads to be withstood. Where the horizontal slabs join the vertical wing walls the ½-in. flat sheets of the vertical built-up slabs are stopped and the horizontals made long enough to rest on the edges of the ½-in. sheets. In addition, 1½-in. square batten strips are used in these corners and bolted through the verticals and the horizontals, thereby serving to tie the entire structure together rigidly and make it act as a solid unit. The intermediate barriers for isolating phases are of flat asbestos either ½ or 1 in. thick. The structure doors are also of asbestos lumber, having 1-in. thick frames with ¼-in. panels rabbeted in.

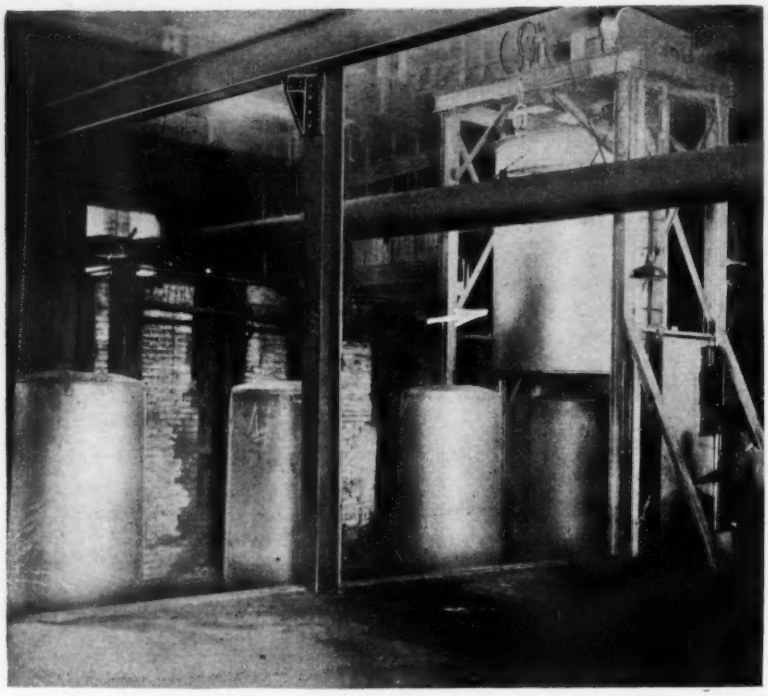


Fig. 1—Bell-type furnace containing central and concentric cylindrical heating elements hoisted over gas-tight hoods covering charge

Bright Annealing in Gas Atmosphere

By S. Z. OWEN

Industrial Heating Engineer
Westinghouse Electric & Manufacturing Company

LOWERED over the work like an inverted bowl, a battery of large bell-type furnaces are being used to bright-anneal stacks of coiled cold-roll strip at the plant of a large steel manufacturer. The 36-in. outside diameter coils are stacked 50 in. high on bases and a gas-tight hood placed over them. All atmospheric air is flushed out of the furnace by city gas and later replaced by the proper annealing gas. Heating and cooling are done underneath the hood in the presence of the reducing gas, thus preventing oxidation and maintaining a clean, dry surface throughout the process. From eight to twelve hours is required for heating the stack of steel and 30 hours for cooling. This, of course, depends upon the weight of the charge. While the charge is heating under the furnaces on one base four other charges are cooling and one of these is unloaded and reloaded ready for the next heat. Thus, by having several bases, the furnace bell itself is kept in continuous operation.

Correct temperature distribution is very important for best bright annealing. The furnace bell contains the heating elements, which are located on the side walls and in the center, a cylindrical space in the center of the hood admitting the center heater. Heating from the outside and from the center also gives very even temperature distribution on the work, the temperature of the center heater as well as the side heating elements being closely controlled by two pyrometers.

To produce the proper annealing gas anhydrous liquid ammonia is broken up into its components, hydrogen and nitrogen, by passing ammonia over a hot catalyst and the hydrogen nitrogen mixture is then used as a reducing atmosphere in the annealing operation. Its particular advantages are its absolute purity, the total absence of moisture and the comparative ease of controlling the process of dissociation. The ammonia is purchased usually in cylinders, which are set on scales so that the operator may know how much has been used from the supply. By volume, the gas produced is about 25 per cent nitrogen and 75 per cent hydrogen.

Ammonia is not very stable and therefore it is comparatively easy to break up into hydrogen and nitrogen. In chemical symbols $2\ NH_3 = 3H_2 + N_2$. The volume is doubled when dissociated. Anhydrous ammonia is low in cost, easily stored or shipped and produces a pure, desirable gas for bright annealing.

The usual ammonia tank holds about 100 lb. of liquid ammonia at 100 to 150 lb. pressure, depending upon the temperature. Each tank will produce approximately 4,500 cu.ft. of dissociated ammonia gas. Tight connections are essential. A swab dipped in hydrochloric acid indicates leaks by a white vapor when ammonia comes in contact with the acid.

The average amount of ammonia gas used for a 10,000-lb. charge of fairly clean work is approximately:

40 cu.ft. per hour × 11 hours (htg). = 440 cu.ft.

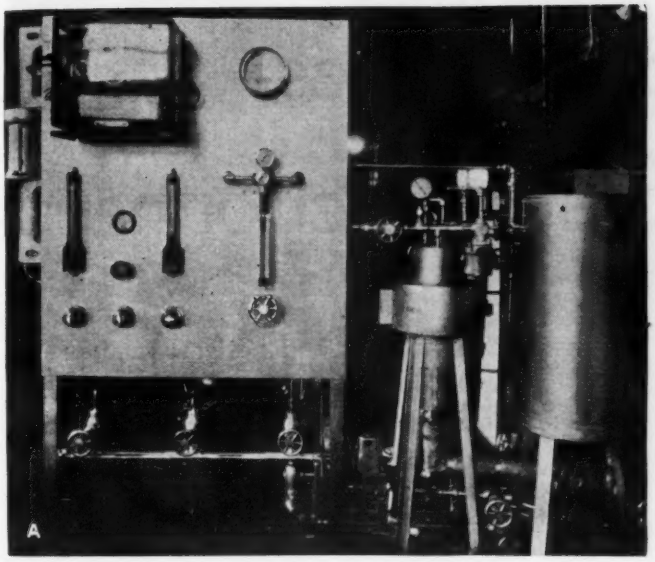
This amounts to approximately 2.3 lb. of ammonia per ton of work. (No gas is used while cooling.) Slightly more gas is required if the steel has much oil on it.

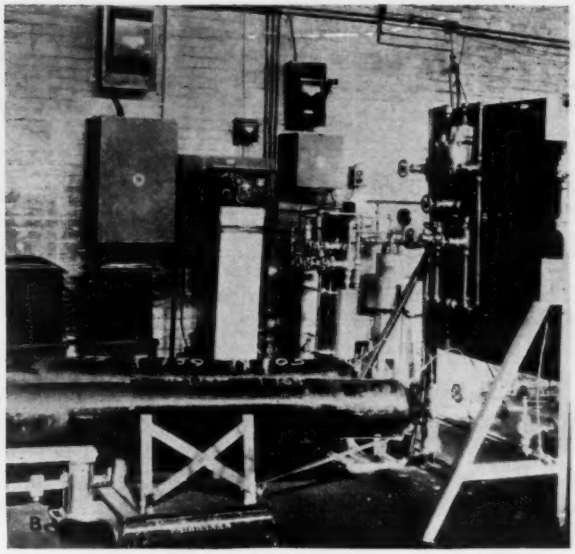
In operation the ammonia passes from the tank through an automatic shut-off valve. In case the power supply fails the valve is closed and an alarm bell rings, thus preventing undissociated ammonia from going into the furnace chamber. The ammonia passes over an electric heater and is vaporized and the heater is controlled with a series-parallel snap switch to give a variation in temperature as required. The gas passes through a flowmeter, which controls the amount of gas as adjusted, and is passed over a sutable catalyst in the dissociator, which hastens the breaking up operation. The temperature of

Bright Annealing Furnace Data

(From Actual Test)

Material—Cold-rolled steel	Weight per Charge	Size Tightly Coiled	Cycle (350 Deg. F.) Heating	Cycle (350 Deg. F.) Cooling	Gas Flow Heating	Gas Flow Cooling	Works Produced Condition	Pounds of Work per Kw.-Hr.
0.15 carbon	10,000 lb.	0.009 to 0.063 in. thick x 1¼ to 7 wide	11 hours	30 hours	40 cu.ft.	None	Bright, clean 53 to 60 Rockwell hardness "B"	15





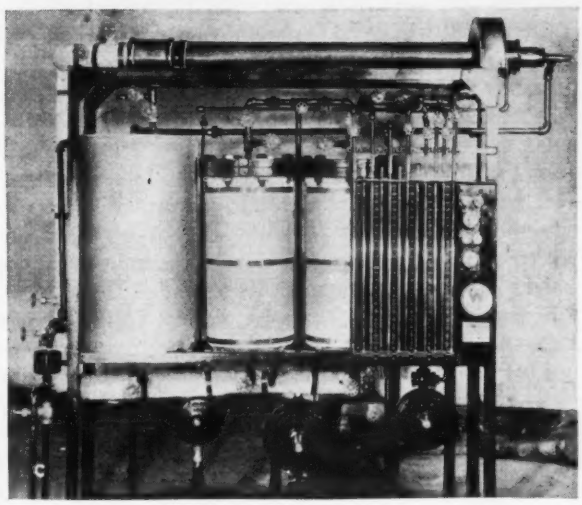


Fig. 2 A, B, C—Apparatus for producing annealing gas
(A) Ammonia dissociator. (B) Accessory apparatus. (C) Hydrogen burning equipment.

the dissociator is automatically controlled by a recording pyrometer at about 1,200 deg. F.

A test furnace is used to test the cleaning power of the gas on the steel to be heat treated. A piece of steel is heated in the test furnace exposed to the gas. If the steel is cleaned the dissociated gas is suitable for use.

In some annealing operations pure nitrogen is used as an atmosphere rather than nitrogen and hydrogen. An auxiliary unit placed after the dissociator in the annealing gas supply system does this. The unit consists essentially of a combustion chamber, where air is mixed with the nitrogen-hydrogen gas coming from the dissociator and then igniting, burning out the hydrogen and leaving a mixture consisting of the nitrogen originally in the dissociated ammonia, the nitrogen taken in with the air and the moisture resulting from the combustion. Passing the gas through a condenser coil and subsequently through a dehydrating medium, such as activated alumina, removes the moisture, leaving pure nitrogen gas.

Assuming that the apparatus consists of one bell, five bases, five hoods, one dissociation apparatus, one control apparatus and one hoisting equipment, and that it is desired to bright-anneal cold-rolled strip 0.009 to 0.063 in. thick having a carbon content of 0.15 per cent: The bell of the furnace is preheated, but the base and the charge are started at room temperature. Working seven days per week and making fifteen heats, 75 tons can be produced per week; 15 lb. of work is produced per kilowatt-hour. The work produced is bright and clean and the Rockwell "B" hardness is from 53 to 60. Five tons of work makes up a charge and a temperature of 1,350 deg. F. is reached in eleven hours. The annealing gas is permitted to flow at a rate of 40 cu.ft. per hour during the heating cycle, but no flow is permitted during the 30-hour cooling cycle. At the end of the 30-hour cooling cycle the charge has cooled to about 300 deg. F. These data are shown in the accompanying table.

▼

Byproducts of Good Substation Lighting

Externally visible substation lighting is a means of arousing popular interest in progressive practice which is easily overlooked. In outlying areas a well-illuminated substation often offers a striking contrast with other structures and even on a city lot is capable of attracting considerable attention from passers-by. The value of good appearance in company structures is self-evident, and poor lighting impairs this too much to be permitted. If fixtureless lamps are provided to light a substation interior visible from a passing motor car or sidewalk the operating company misses an opportunity to exhibit modern units and well-planned applications at very small cost. The advantages of first-class exterior and interior lighting in both manually operated and remote-controlled installations need no argument on the score of increased safety and convenience. It is worth while to seek to make the most of such installations also from the standpoint of business building. Certainly when adequate illumination is preached by the sales department to customers and prospects, all company plants should illustrate the best methods in practice. First-class lighting is a helpful influence in public relations, and now is a good time to scrutinize plant from this angle.

"Standards" Control Improves Station Performance

By C. D. ZIMMERMAN
Assistant Superintendent of Production
Ohio Edison Company, Akron, Ohio

Economy gains and easier operation result from standards set on tests and analyses of equipment performances in normal operating conditions.

ALL ELECTRICITY generating stations of any appreciable size are now operated with some degree of technical control of equipment performance. But too often technical control, if ever it was anything more, degenerates into the perfunctory accomplishment of routine tests and checks whose records are carefully filed away against the time for them to be thrown out to make room for a new accumulation. But it is possible for technical control to be a live thing, continually to set up new yardsticks for the measurement of performance and thus to improve plant operation. In some generating stations the possibilities of technical control are so realized. It is the purpose of this article to discuss one way in which this is done.

Technical control may be divided into two lines of procedure: (a) Comparison in complete detail of actual corrected performance with possible performance and (b) development of improved methods.

An ideal device for power plants would be an instrument that would write down each fault in equipment coincident with its occurrence, as for example: "Crack in first baffle No. 3 boiler now bypassing 10 per cent gas." Primary nozzle No. 4 steam jet for air removal from No. 4 condenser now ineffective. "Soot blower No. 4 in No. 3 boiler is now cracked," etc. The object of this article is to show that this ideal can be approached surprisingly close by intelligent application of technical control.

Method of establishing detailed standards

If standards for each unit or auxiliary having an appreciable effect on plant economy are properly set up and the loading divided properly the over-all plant economy will also be properly taken care of.

The standard of performance for each unit or auxiliary should be based on the best results of actual operation or tests of such workable character that the method can be carried on indefinitely in actual operation. Manufacturers' guarantees should never be used as standards for two reasons: First, they are often found to differ considerably from the best possible performance, being too high in some cases and too low in others, and, second, plant operators have faith in standards based on results which they have seen obtained, but have little or no faith in standards based on theories or more technical calculations.

Tests run under conditions which can be repeated in normal operation and with the unit in good repair are acceptable as standards. Most of the tests necessary for this work are usually also run for other purposes.

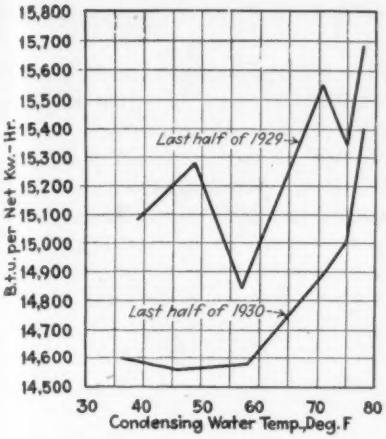
Standards set up for boiler units should show the effect of output, excess air and preheater performance on flue gas and superheat and also the effect of feedwater temperatures and economizer performance on superheat. It is obvious that the boiler operators cannot properly observe the quality of performance without these factors. An indication of the value of these corrections in plants where they have been used has been the fact that the boiler superintendents have invariably called for this report in person and arranged boiler work thereby rather than wait for the delivery of the report.

Various standards of equipment performance for one generating station accompany this article. These graphs are illustrative of what can be done. This development of station standards has taken place over extended periods of a year or more. Shorter periods are not sufficient. Reports of variations from standards should be made daily or weekly as required. Reports similar to the one reproduced with this article show operators where improvements are needed and form an excellent guide to repair and cleaning schedules. Where the needed work is not clearly shown by the report, a special report is also included which gives the required information.

All large power plants use some method of checking or comparing performance results with what is felt should be obtained. Most plants take the first step (1) and a large portion also take the further step (2). These steps are:

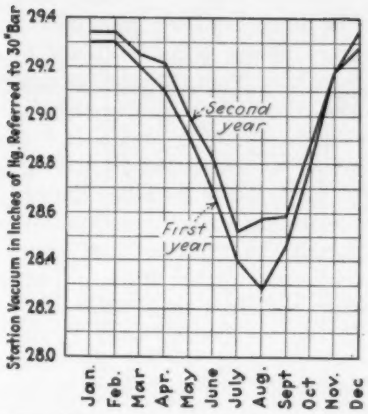
Step	Turbine Room	Boiler Room
(1)	Check condenser vacuum against that on similar machines.	Check boiler efficiency against previous results with rough allowance for coal quality.
(2)	Check condenser vacuum and air leakage on similar machines and with previous year at same inlet water temperature. Individual machine water rates are checked by test periodically (usually annually).	Boiler room efficiency is checked with previous performance with allowance for coal equality. Flue gas temperatures and excess air for individual units are checked with similar units and previous results.

Neither of these steps is in sufficient detail to obtain the proper results since the performance of each unit in the power plant is the product of a number of factors in such a manner that a decrease in efficiency of any one of these factors causes a drop in efficiency of the unit. For example, turbine-room performance is a product of machine loading, internal stage conditions and



Value of technical control

The improvement in heat rate shown by the last half of 1930 over the last half of 1929 was mainly due to improved methods of operation as load conditions and unit use were very similar for the two periods. Costs exclusive of fuel were also lower in the later period.

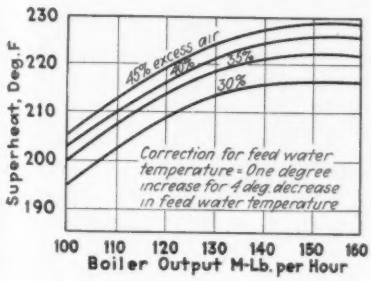


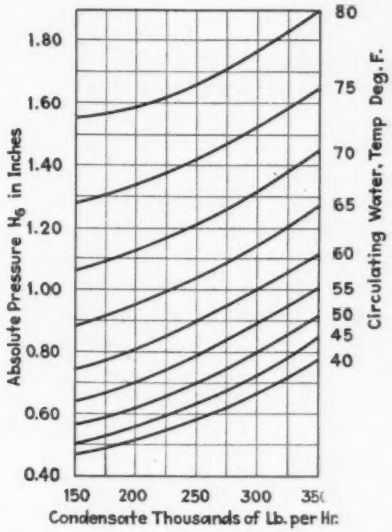
Better vacuum by "standards method"

Plant vacuum improvement under similar load and unit use due to complete vacuum check method. Improvements were made in air leakage, air removal, amount of condensing water and cleanliness of tubes.

Standard for steam temperature

The standard below is corrected for output, excess air and feedwater temperature.



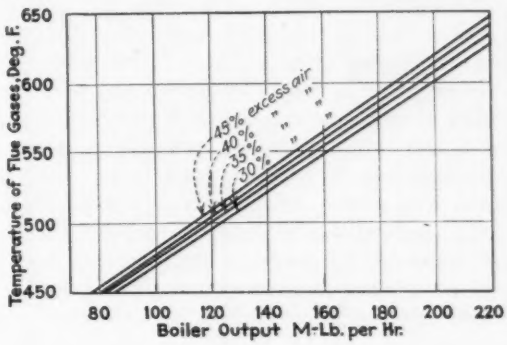


Standard for condenser performance

These curves are based on clean tubes, air leakage below 4 c.f.m., good air removal and correct amount of condensing water, and are also based on actual performance under the conditions.

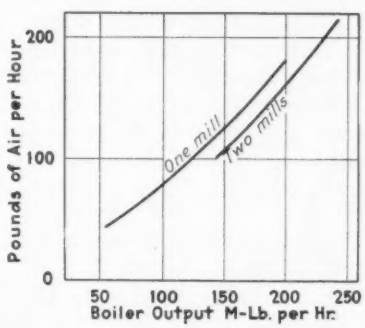
Standard for flue gas temperature

The standard below is corrected for output and excess air. Where air preheaters are used an additional correction must be used.



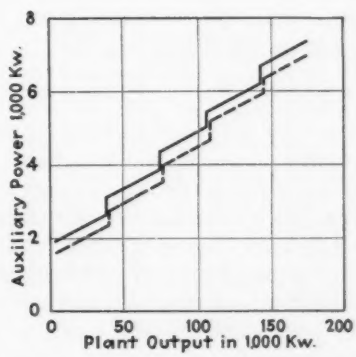
Standard for weight of preheated air

As the weight of air heated times the rise in its temperature is a measure of the gain due to the preheater it is essential that a continuous effort be made to keep this amount at a maximum. Sources of loss are boiler air leakages and amount of air tempering. The useful calculation for the amount of air heated which is based on the ratio of gas temperature drop to air temperature rise is incorrect and high by approximately the amount of preheater air leakage. For example, if the ratio of air to gas is shown by this method to be 70 per cent and the preheater air leakage is 10 per cent, the true ratio of air to gas is approximately 60 per cent. The cleanliness of the preheater is checked by a standard for heat transfer rate corrected for amounts of air and gas passing through the preheater.



Standard for auxiliary power

Variations from standard are caused by boiler excess air, boiler and turbine loading, turbine water rates and excessive valve and damper throttling.



condenser vacuum. Each condenser vacuum is, in turn, a product of condenser load, dirt or scale on the tubes, amount of condensing water, temperature of condensing water, air leakage and efficacy of air removal apparatus.

The importance of knowing all the above factors is well illustrated by the following examples: Three large units of the same type and very similar auxiliaries in a certain plant all gave about the same vacuum, which was felt to be as good performance as could be obtained because of the similarity of results and because this performance checked fairly close with guarantees at some points (this is significant in view of the large saving cited below). The only factor lacking was the

CONDENSER REPORT

Unit No.	1 2 3 4
Load in kw.	
Temperature condensing water in	
Temperature condensing water out	
Condensing water G.P.M.	
Condenser absolute pressure	
Amount off standard due to	
Excessive air leakage	
Insufficient air removal	
Dirty tubes	
Insufficient cond. water at .... r.p.m.	
Total	
Date of last cleaning period	

Typical performance report

This report furnishes operators exact data as to where to make improvements to keep the unit at maximum efficiency and is also essential in calculating economical cleaning periods. The standard for amount of condensing water serves as a check on repair conditions of the circulating water pumps and its drives and does not conflict with calculated economical speeds or number of pumps to use.

amount of air leakage. The then available methods of measuring air discharge from steam jets could not be adapted to the hydraulic vacuum pumps due to prohibitive installation expense. A very small gain in vacuum was obtained by good cleaning methods. A device was finally developed which measured air leakage (described in *Power* May 17, 1927). This showed normal air leakage on two machines, but an excessive amount on the third, although the turbine-room operators had been very zealous in making air tests. When convinced of high air leakage, different tests were made and the leak was found in an unexpected place. This was remedied and attention focused on the first two machines to bring them up to the new standard of the third unit. Since air leakage, degree of cleanliness and condensing water conditions were good, the only factor left was the efficacy of the air pump. This was brought up to normal and the new standard obtained. The *annual saving as a result of this work was $25,000 a year.*

Application of the complete corrected checking system has also resulted in labor saving where condenser cleaning was too frequent due to the lack of a definite standard corrected for all variables.

Another example showing that the steps (1) and (2) cited above are not in sufficient corrected detail to obtain proper results from continuous observation of performance is found in almost any boiler room. Most boiler rooms now consist of a number of different types of boiler units, with air preheaters or economizers or combinations of both on each unit. Flue gas temperatures and steam temperatures are affected by type of unit, feedwater temperature, boiler output, excess air, preheater and economizer performance and internal conditions of the boilers such as soot and scale on the tubes and baffle condition. No boiler room superintendent can possibly check performance of various types of boilers under his supervision without correction curves for all of these factors. Even then it is a technical problem best handled by a technical department.

The rapid developments of the present day in the power station art naturally call for so much development work by operators to iron out unforeseen difficulties that there is a considerable need of research work in operation. The formation of large power systems makes it possible to employ better trained and more specially experienced men in centralized research departments and at lower cost per plant than could be done formerly. Performance research work has been mostly carried out by operators in each plant and no change is suggested to decrease development work of this kind, but it is felt rather that further importance should be given additional research by more technically trained men.

There is also a natural tendency of operators not to make operation too difficult, whereas another department has a tendency to carry the matter further and prove whether or not additional steps will result in more difficult operation and, if so, whether or not it might be worth additional expense. Improvements in efficiency, however, have usually been accomplished with no increase in labor and very often with a very material decrease in labor.

Systematic and complete research studies of machines and operation methods can be carried out with a small test force and equipment, and cases where such procedure has resulted in savings of 5 to 10 per cent and more are very numerous.

Stoker and pulverized coal equipment is continually changing and expert technical study is of great importance. Gas stratification is always an important factor and CO_2 recorders should not be used with boiler equipment without study of and proper allowance for gas stratification. An apparatus has been developed which is of particular value in this work as five separate gas analyses can be made simultaneously in about one-half more than the time required for an individual Orsat analysis. Improvement due to this work is less first-pass slagging, lower labor costs and greater efficiency.

Test or results department policies

The entire procedure of test or results departments should aim for the confidence and understanding of the operators. No recommendation for a change in regular operation should ever be made which has not been shown practical by actual operation. Test or results department heads must feel that they are, first, potential operators and, second, technical workers or else their recommendations will receive a minimum of attention.

It is the writer's belief that a complete paper could be profitably devoted to test accuracies as contact with a large number of plants shows this subject to be widely misunderstood and under-rated by both test engineers and executives whose experience has been devoted to operation. Test results should be proved "beyond reasonable doubt," which can be assured by following A.S.M.E. standards for this work, otherwise wrong conclusions result from incomplete or inaccurate tests, with consequent waste of time and money. The most common errors are leakage through valves supposed to be tight, starting and stopping losses with tests of too short a duration, inaccurate meters and conclusions based on tests insufficient in number to balance unavoidable inaccuracies per test. Another common fault is the lack of an open mind by the investigator who seeks to fit the results to a preconceived theory rather than permit results to determine the conclusion.

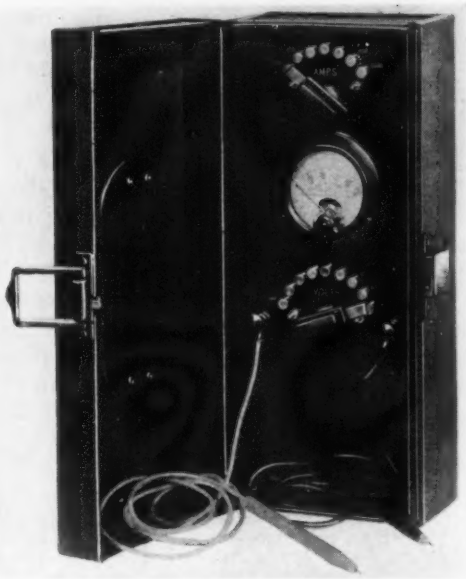
Purchased Power and Process Steam

My opinion is that no industrial to which purchased power is available from a reliable source has any business generating a kilowatt-hour from which the exhaust steam cannot be used and, conversely, no utility has any business selling a kilowatt-hour to an industrial if the exhaust steam from that kilowatt-hour can be used in process work. In other words, true economy of investment and operation can only be had by parallel operation of the utility with non-condensing or perhaps with bleeder equipment in the industrial plant. This plan would reduce capital expenditure by both parties.

GROVER KEETH,
Chief Engineer Marathon Paper Mills Company, to Great Lakes Power Club.

Meter Detects Potential Weakness in Control Wiring

By A. P. SESSIONS
Southern California Edison Company, Ltd.



Portable test meter for measuring resistance of leakage path to ground over station control cables

IN RECENT years pressing demands for reliable operation and continuous service have placed a greater premium on perfect performance of control systems, with the result that an ever closer and closer check of the condition of control wiring has been necessary. Before the year 1926 very little lead cable was used by the Southern California Edison Co., Ltd., for control circuits. It was the rule to use colored code or standard code wire in iron conduits. These circuits must still be maintained. Some of the circuit lines in every large installation would develop moisture inside the conduit, deteriorating the insulation on the wires and, through development of d.c. leakage path to ground, hasten the time of breakdown.

In stations having solenoid-operated switches control ground troubles were found to occur at the time of breaking the current on the closing solenoid, caused from the momentary high-voltage inductive kick of de-energizing the large coil. These grounds were often "flash" grounds, continuing for only a fraction of a second, but often furnishing sufficient stray circuit current to cause a false operation. It was decided to install d.c. ground detectors on all battery control systems. This gave an alarm when each ground occurred, whether it was a "flash" ground or a steady one. But it was found that false operations did occasionally occur in spite of these precautions. Subsequently a periodic "high-potting" of control wires with an a.c. potential of 440 volts to ground found the weak points, but the wires to be tested by this means had to be taken out of service and isolated from the rest of the control system to insure that the testing process would not bring on additional trouble.

Effort was next made to find a cheaper and better method of anticipating weakness of insulation without taking the control wires out of service. The idea of measuring leakage current from each side of the battery to ground with a low-resistance ammeter seemed to offer the best solution to the problem, but several difficulties had to be overcome in order to do this successfully.

First of all, the ammeter must be attached as a voltmeter to prevent possible short-circuit damage if there should be a low-resistance leakage path to ground on the control system. After this check is made to prove the system relatively clear from ground the voltmeter resistance can be cut out, preferably in small steps, so that the meter is thus changed from a voltmeter to a milliamp-meter.

In order adequately to measure all cases it was found necessary to be able to read current from zero up to one ampere, preferably in several ranges, most stations having sufficiently high resistance to require a meter with full-scale deflection at one milliampere.

Another problem which had to be solved was the problem of connecting such a delicate instrument into a circuit having such a great electrostatic capacity without giving the instrument a damaging "kick." In solving this particular problem the decision was made to devise a special meter for this work.

Wiring diagram of meter for testing station control circuits

A Weston Instrument Company type 301 milliammeter, having a full-scale deflection at 50 millivolts, one milliampere, was mounted on a bakelite panel, together with two General Radio No. 202, four-leaf rheostatic type switches. Each switch had six or eight points, connected as shown in the accompanying wiring diagram, all equipment being neatly installed in a convenient metal bond box about 6x6x14 in. The instrument is used as follows:

1. The d.c. control system is first cleared from all known circuits to ground, such as ground indicating lamps, ground detectors, etc.

2. The plus terminal of the meter is connected to the plus terminal of the control system battery, and with all the resistance of the meter cut in the negative terminal of the instru-

ment is connected to ground. Some deflection will probably be noticed on the meter. Step by step the series resistance of the voltmeter can then be cut out. The indication of the meter increases somewhat, but rarely in proportion to the rate at which the resistance of the meter is cut out, for the resistance of the leakage path to ground becomes a larger percentage of the total, as the resistance of the meter is reduced. When a point is reached that the next change of range may throw the meter off scale the ammeter shunt switch is brought into play, thus cutting down the indication as the ammeter range is increased and keeping the meter from going off scale, while the remaining steps of voltmeter resistance are cut out.

It will be noted that the rheostatic type of switch is so made that the change from one range to another, for either the voltmeter resistances or the ammeter shunts, is accomplished without breaking the circuit. Also it will be noted that the rheostatic type switches make sliding contact on both ends of four separate parallel arms so that the contact resistance is very low, reliable and quite constant.

In making use of the meter it is always connected first as a voltmeter and is changed slowly to an ammeter without breaking the connection. This enables the instrument to absorb the "electrostatic capacity kick" of the control system in small increments so that the meter is never thrown completely off scale, even when making measurements on the control system of a large station.

When the point is reached that all the series resistance is cut out a direct reading of leakage current is taken and recorded. The same process is then applied to the other terminal of the battery system, starting as a voltmeter, cutting out series resistance and cutting in parallel shunts. In this case the negative terminal of the instrument is connected to the negative terminal of the control system with the positive terminal of the instrument to ground. The battery voltage is also measured and recorded. From these values the resistance of the leakage path from each side of the control system to ground may be determined by the application of Ohm's law. An example follows, illustrating the method of determining ground leakage path resistance:

Battery voltage equals 130 volts.

Current leakage from positive terminal of control system to ground equals 1.3 milliamperes.

Current leakage from negative terminal to ground equals 0.26 milliampere.

Using values above $\frac{130}{1.3} \times 1{,}000$ equals 100,000 ohms resistance between negative terminal and ground.

$\frac{130}{0.26} \times 1{,}000$ equals 500,000 ohms resistance between positive terminal and ground.

When the resistance is found to be very much lower on one side of the control system than on the other, or when either side measures below 25,000 ohms for a 130-volt control system, or 10,000 ohms for a 35-volt system, further sectionalizing of the control should be obtained so as to locate the low-resistance portion. Often the trouble will be located in some one conduit or cable run, in which case all of the wires in the conduit should be replaced or a new cable pulled in.

Among the points in favor of this method of testing for condition of control systems are the following:

1. Only a couple of minutes is required for the test, which quickly established the fact that a station is in good condition or is in a questionable condition and needs further checking. At least nine-tenths of the stations will show to be in good condition. These are thus eliminated from the maintenance list almost without cost as compared with any other previously used method.

2. The test has a lower element of risk to service than other methods.

3. No part of the control system is removed from service while it is being tested, unless real cause for isolation is found.

4. No connections are unnecessarily disturbed.

5. The condition of each control system can be followed from one testing period to the next, so that year after year the lowering resistance will tend to indicate the time when maintenance work must be done.

6. This method permits absolute elimination of control troubles due to ground leakage.

7. The meter element itself is inexpensive, so that if there should be an insulation breakdown while the test is in progress replacement of the meter element will cost but a few dollars.

In addition to the above-mentioned features, the meter is a standard 50-millivolt meter and when placed on the 1-milliampere range with the series resistance cut out it can be used in connection with the proper standard 50-millivolt shunt for measurement of current of any value.

We have placed one of these instruments, constructed by the local representative of one of the large instrument companies, in each of our operating divisions, in the hands of the test electrician as a part of his equipment for routine testing.

It is estimated that these instruments will save from four to six times their cost each year in maintenance costs and will provide the means of keeping a closer check on the condition of control wiring than ever before.

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READERS' FORUM

36-Kv. Generators

To the Editor of the ELECTRICAL WORLD:

In an article which appears in the ELECTRICAL WORLD of October 16 entitled "36-Kv. Generators Arise from Insulation Research," by P. R. Sidler, the author makes the following statement in reference to the Parsons high-voltage alternator: "For such a disposition of the windings it is necessary to connect the neutral point rigidly to ground as the single layers, of course, cannot stand the full rated voltage." This is not a statement of fact. Parsons high-voltage alternators using their patented concentric conductors are designed to operate with earthed or unearthed neutrals.

The first high-voltage alternator of the Parsons construction has been in operation in the Brimsdown power station of the North Metropolitan Power Stn. Co. Ltd. since August, 1928, and has operated during the whole of this period with an insulated neutral and has not suffered in any way. During this period it has been subject to surges and short circuits, many of which have been closely adjacent to the power station. The alternator is directly coupled to a large overhead and underground network.

The plant has operated during most of its life at 35 kv. and was designed to stand the normal range of 33 kv. to 36 kv. as is the case for all our plants of this voltage. It may interest you to know that Messrs. Parsons have six alternators, either under construction or in commission, up to the outputs of 37,500 kva. designed for operation at 36 kv.

Mr. Sidler refers to the flexible type of insulation as a recent development. I would refer to the following

statement, made in a paper by the undersigned, "Some Problems in High-Speed Alternators and Their Solution," read before the Institution of Electrical Engineers in 1923 and published in its journal, Vol. 61, No. 317, April, 1923:

In earlier practice, methods of manufacture had been developed in which the insulation molded round the conductors formed a compact mass with the copper and had almost a metallic ring when knocked with a hammer; conductors insulated in this way made a great appeal to engineers, owing to their resemblance to a metallic structure. The disadvantages of this method of insulation did not appear until later.

A flexible mica insulation had therefore to be devised.

Flexible insulation has provided a satisfactory solution. . . .

In this paper it is made clear that Messrs. Parsons have used the flexible type of insulation since 1913, and the reason for the adoption of this type is explained. Since that time the quality of their material has been constantly improved.

I trust that the above information will be of some interest to your readers.

C. A. Parsons & Company, Ltd.
Heaton Works, Newcastle-on-Tyne, England.

J. ROSEN,
Director.

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BOOK REVIEWS

Man-Hour Electrical Estimating Manual

By Theodore Heinzerling. Published by Rurick Press, Inc., 303 West 42d Street, New York. 384 pages (8 x 11 in.). Price, $10.

Here, at last, is a collection of unit figures that take electrical cost estimating out of the guessing contest. Of course there is no such thing as exact predetermination of costs, because of contingencies that arise and possible oversight, but the best estimates are the closest approximations and this data book seems to afford the key. First of all it is prepared by a man who is a consulting engineer in New York City with membership in six major associations. It is reported to be based on actual labor data involved in constructing 5,000 buildings, and not on theories or estimates. The book is divided into three major sections—(1) about 3 per cent on detailed directions of how to prepare estimates including itemizing, taking-off quantities, measuring circuits, estimating vertical runs, pricing, etc.; (2) 366 pages of man-hour data required for every kind of electrical wiring in every kind of building; (3) reference data on wire-carrying capacity of conduit, starting switches and fuses for all sizes of motors; sizes of pulleys and gears for different speeds and loads; panelboards, and carrying capacity of conduit for lead-covered cable.

The data on man-hours are divided into competitive, conservative and compensative groups for seventy-one types of equipment, including the following: Annunciators; bell equipment; outlet boxes; conduit in floor slab (or on top); conduit elbows, fittings; fire alarm and watchmen's systems, fastenings; telephones; lug soldering; motors; metal molding; panelboards; control switches; wiretaps and splices; steel cabinets; connecting strips; underfloor duct; wire pulling; flexible cable, and wiremold. Man-hours may be read direct from the tables and multiplied by the local labor cost per hour. It is reported that this manual permits preparing highly accurate estimates in about one-third the usual time.

Geschichtstafeln der Elektrotechnik

(*Chronology of Electrical Engineering*)

By Prof. Sigwart Ruppel. Verein Deutscher Elektrotechniker, Berlin-Charlottenburg 4, Bismarckstrasse 33. 127 pages, 67 cuts, five charts. Price, paper, 6.00 reichsmarks; linen, 8.50 reichsmarks.

A vast amount of research must be embodied in this volume, containing page after page of dated events in the history of electrical progress. Here are possibly 3,000 items, perhaps more, beginning with the earliest recorded discoveries and carried chronologically through the various fields into which modern technology has developed—electrical machinery, batteries, control, insulation, measuring apparatus, lighting, communication, electric waves, electrochemistry, medical applications and others.

The author has set himself the task of recording events, not of evaluating their significance. His references are largely to new developments in his own country. This applies particularly to technical applications. The parallel introduction of similar processes, methods or devices in other countries is often ignored.

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Farm and Village Housing

By President's Conference on Home Building and Home Ownership, Department of Commerce Building, Washington, D. C. Price, $1.50.

To the 5,000,000 American farm homes in which all water for household use is still carried in from the well by hand, waste is carried out in pails and lighting is by kerosene lamps, the President's Conference offers in the publication of its final report, Vol. VII, on "Farm and Village Housing" a program for the improvement of these primitive conditions. If farmers cannot afford new dwellings, they can repair and remodel those they have. The authors of the report believe that the poor physical quality of most farm homes, indicated by the presence of piped-in water in less than one-sixth of America's farm dwellings, and by the general absence of labor-saving devices, is due as much to indifference and to lack of information on how to make improvements economically as it is to low incomes. Accordingly a major feature of the report is that it brings together existing information to serve as a manual for the farmer. There are instructions on how the farmer can acquire plumbing, electricity and heating equipment bit by bit at a cost which the majority could probably afford.

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Technological Dictionary

Sixth edition of Hoyer-Kreuter revised by A. Schlomann. Julius Springer, Berlin. Sole U. S. agent, the Industrial Press, 148 Lafayette Street, New York, N. Y. Three volumes, 2,295 pages. Price, each volume, $19.50; two volumes, $37.50; three volumes, $55.

Of the vocabulary of technologic science and industrial trade some 100,000 words and compound phrases are included in this new edition. Volume I gives the English and French equivalents of alphabetically arranged German words. Volume II has the English words alphabetically arranged and Volume III, shortly to appear, enters with the French terms. Much effort has been made to render the compound expressions easily accessible. This work is sponsored by the German engineering and technical industry groups and individual engineers and firms engaged in international trade will find it a distinct aid to concise technical translation.

Men of the Industry

L. C. CLARK has been named manager in Farragut, Iowa, of the Iowa-Nebraska Light & Power Company to succeed the late W. S. Coy.

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ARTHUR C. ROY, formerly in the sales promotion department of the incandescent lamp department of the General Electric Company, has been transferred to the advertising division of the air-conditioning department.

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D. W. MCLENEGAN, formerly connected with the industrial engineering department, has been appointed assistant engineer of the commercial engineering division of the General Electric air-conditioning department. A native of Milwaukee and a graduate of the University of Wisconsin in mechanical engineering, Mr. McLenegan became a member of the student engineering course at Schenectady in 1922.

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E. H. PERRY, consulting engineer, Merchants' and Manufacturers' Association, Los Angeles, has been appointed to the position of general manager of that organization. As an electrical engineer he was employed by Stone & Webster in the Pacific Northwest from 1913 to 1917 in the construction of generating plants and in other public utility work.

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GAYLORD B. BUCK, general commercial manager of the Public Service Company of Colorado, has been elected a member of the board of directors of that utility. Other new directors include Frank S. Henderson, Boulder manager; C. G. Keeler, Pueblo manager, and Charles Rump, Grand Junction manager.

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J. B. CLAPP has been appointed district representative for the James R. Kearney Corporation of St. Louis in the territory embracing the eastern half of the state of Pennsylvania, all of New Jersey, Delaware, District of Columbia, Maryland and a portion of the state of West Virginia. Mr. Clapp is well known in this territory by reason of his past connections with the Public Service Electric & Gas Company of New Jersey, the International Telephone & Telegraph Corporation and his more recent association with the Copperweld Steel Company.

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G. H. DAVIS, formerly connected with the rate department of the Electric Bond & Share Company, is now rate engineer for Middle West Utilities Company. Until 1928, when he entered the Bond & Share organization in New York, Mr. Davis had been for about twenty years with the Idaho Power Company, advancing successively from his first operating position through the positions of district superintendent, division manager and, following a complete valuation under his charge of the company's properties, rate engineer. Previous to this connection and following his graduation in electrical engineering from the University of Maine, Mr. Davis had passed through the General Electric Training School and had been in the employ of what was at that time the Portland (Ore.) Electric Power Company for a short time.

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OBITUARY

LEWIS N. HEEBNER, general manager of the Manchester (Conn.) Electric Company, subsidiary of the Connecticut Power Company, died November 18, following a heart attack. Mr. Heebner was born 67 years ago in Lee, Mass. He became connected with the electrical industry in New York and later in Waterbury and Hartford. Mr. Heebner became general manager of the Manchester Electric Company 44 years ago, when it was organized by Cheney Brothers.

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WALDO E. CONANT, for the past 21 years a member of the board of electric light commissioners at Littleton, Mass., died in that town, November 17, at the age of 77. For many years he was prominent in the textile webbing manufacturing field.

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CHARLES F. MEDBURY, manager of the Montreal office of the Canadian Westinghouse Company, Ltd., died recently. Mr. Medbury held executive positions with electrical manufacturing companies in both Canada and the United States, including the managership of the Montreal office of the Canadian General Electric Company. After this connection he went to Ottawa, thence to New York, Chicago and Detroit, where he was manager of the local office of the Westinghouse Electric & Manufacturing Company. In 1909 he was transferred to Montreal as manager of the office in that city, a position he held until the time of his death. His association with the Westinghouse company covered a period of 36 years. From 1930 to 1932 Mr. Medbury was a member of the executive committee of the Canadian Electrical Association.

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New Equipment Available

Color Code Used on Fuse Cartridge

To expedite fuse replacements and reduce the time of outage on a line, the Bowie Switch Company, San Francisco, uses a color code on the fuse cartridge which enables a lineman to identify the rating of the particular fuse immediately. By varying alternate bands of a given number of colors, which have been selected because they are easily distinguishable at a distance, a sufficient number of combinations are available for all standard fuse ratings. In answering a service call the lineman, instead of disassembling the blown fuse to make a replacement of the correct rating, replaces it with another fuse having the same coding from a stock of spares supplied with each trouble car.

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MOTORIZED SPEED REDUCERS of high efficiency, capable of employing nearly any type of motor, according to the manufacturers, have been announced by the Louis Allis Company, Milwaukee, Wis. The motor and speed reducer are combined into a single, compact, self-contained unit which makes an easily mounted, slow-speed drive for many types of industrial machinery. Ratings available are ¾ to 75 hp. with output speeds from 4 to 400 r.p.m.

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TWO NEW NOVALUX LIGHTING FIXTURES and two reflectors as additions to its line of street-lighting equipment have been announced by the General Electric Company. These are the form 56 Novalux lantern, the form 52 Novalux luminaire, a new reflector for street-lighting fixtures and a reflector for alley-lighting fixtures.

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THE PERMUTIT COMPANY, New York, has announced a new fully automatic industrial zeolite water softener which it is claimed eliminates the errors due to the human element and conducts all of the operations of softening and regeneration with machine-like regularity and precision. By a combination of a meter-operated switch and electric controls with a motor-driven Permutit single valve, each operation of the water softener is conducted under such precise control that the highest efficiency results, the manufacturer states.